UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA
Escuela de Doctorado

PROGRAMA DE DOCTORADO EN TURISMO, ECONOMÍA Y GESTIÓN POR LA UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA

FINANCIAL BEHAVIOR OF FAMILIES IN SPAIN

COMPORTAMIENTO FINANCIERO DE LAS FAMILIAS EN ESPAÑA

Tesis doctoral presentada por:

JOSÉ RAMÓN ZAGALAZ JIMÉNEZ

Realizada bajo la dirección de:

Dra. INMACULADA AGUIAR DIAZ

Las Palmas de Gran Canaria, julio de 2019

UNIVERSIDAD DE LAS PALMAS
DE GRAN CANARIA

Dª. BEATRIZ GONZÁLEZ LÓPEZ-VALCÁRCEL, COORDINADORA DEL PROGRAMA DE DOCTORADO EN TURISMO, ECONOMIA Y GESTIÓN DE LA UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA,

INFORMA,

Que la Comisión Académica del Programa de Doctorado, en su sesión de fecha 29 de julio 2019 tomó el acuerdo de dar el consentimiento para su tramitación, a la tesis doctoral titulada "FINANCIAL BEHAVIOR OF FAMILIES IN SPAIN" presentada por el doctorando D. José Ramón Zagalaz Jiménez y dirigida por la Doctora Inmaculada Aguiar Díaz.

Y para que así conste, y a efectos de lo previsto en el Artº 11 del Reglamento de Estudios de Doctorado (BOULPGC 7/10/2016) de la Universidad de Las Palmas de Gran Canaria, firmo la presente en Las Palmas de Gran Canaria, a 29 de julio de dos mil diecinueve.

GONZALEZ LOPEZ-
VALCARCEL BEATRIZ -

UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA
Escuela de Doctorado

PROGRAMA DE DOCTORADO EN TURISMO, ECONOMÍA Y GESTIÓN POR LA UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA

ESCUELA DE DOCTORADO

Título de la tesis:

FINANCIAL BEHAVIOR OF FAMILIES IN SPAIN

COMPORTAMIENTO FINANCIERO DE LAS FAMILIAS EN ESPAÑA

El doctorando — José Ramón Zagalaz Jiménez

La directora — Dra. Inmaculada Aguiar Díaz

Las Palmas de Gran Canaria, julio de 2019

To Laura and Lucia, for the stolen time.

To my parents, for the lost time.

GRATITUDES

Through these lines I would like to thank all those people who have helped me in the hard work done to finish the present doctoral thesis.

First of all, I want to thank to my director, the Ph.D. Inmaculada Aguiar, for the trust and support shown throughout this process. Since that first meeting in her desk in October 2016, I have enjoyed this rewarding experience, both academically, personally and professionally. Her extensive experience has guided me and helped me to understand the importance of rigor in scientific research and has been a great motivation during these almost 3 years.

To my beloved family, I want to thank Laura for her love, her understanding, her support and her patience and as always, to discover myself to the great mother and woman that she is. I consider myself very fortunate to have her by my side. I also want to thank my parents for the patience they have had and the efforts they have made with their children. They are an example for those of us who are lucky enough to have them nearby. While I get excited writing these lines, I cannot stop remembering my sisters, some super women who are a great example for their brother and their children.

I also would like to thank, João Peixoto for having opened the doors of the Universidade of Lisboa up to twice and for having placed a table in front of the new building at my disposal.

Finally, I end these lines by offering my apologies for the errors or omissions that may exist in this thesis, assuming exclusive responsibility, if any.

INDEX

INDEX OF TABLES

Tables Chapter 1

Tables Chapter 2

Tables Chapter 3

Tables Chapter 4

EL COMPORTAMIENTO FINANCIERO DE LAS FAMILIAS EN ESPAÑA. SÍNTESIS

El estudio sobre el comportamiento financiero de las familias ha generado un creciente interés tanto en la comunidad académica, como en el ámbito profesional o la sociedad en general. En primer lugar, para la administración pública, es útil para predecir el comportamiento de las familias con objeto desincentivar conductas perjudiciales para el conjunto de la sociedad. En segundo lugar, a nivel normativo. la normativa MiFID tiene por objeto incentivar la protección al inversor. En tercer lugar, a las entidades financieras les interesa conocer las preferencias y actitudes de los clientes con objeto de orientar adecuadamente sus productos y servicios.

En este sentido, la motivación personal por el estudio del comportamiento financiero tiene su origen en el desarrollo de mi carrera profesional en la banca durante más de diez años. En este período he tenido la oportunidad de observar las reacciones de los clientes ante la oferta de nuevos productos o servicios, así como el escaso conocimiento de conceptos financieros básicos para tomar decisiones adecuadas. La citada normativa MiFID exige a los profesionales de banca conocer el perfil de riesgo de los clientes con objeto de ofrecerle los productos financieros más adecuados, evitando que contraten productos con un grado de riesgo que no son capaces de entender o tolerar. Por último, las consecuencias del proceso de digitalización de la operativa bancaria es otro aspecto que está cambiando la forma de trabajar en el sector financiero.

Por otro lado, los cambios socio-demográficos que se están produciendo entre la población como el aumento de la esperanza de vida, la mayor presencia de la mujer en la universidad, así como la incorporación de la mujer al mercado laboral, presenta una oportunidad para analizar la incidencia de estas nuevas situaciones en el comportamiento financiero de los hogares, y en particular del papel de la mujer.

El tema central de la presente tesis es el estudio del comportamiento financiero de las familias en España, concretamente se analiza la incidencia de las características socio-demográficas y económicas de las familias en la *financial literacy*, la tolerancia al riesgo financiero y el uso de la banca online. En los dos primeros se hace especial referencia al género, mientras que en el tercero se pone el énfasis en el nivel educativo.

Antes de exponer los citados trabajos se presenta un capitulo introductorio en el que se abordan los aspectos comunes a los tres estudios, tanto en lo referente al marco teórico como a las fuentes de información utilizadas.

Capítulo 1. Introducción

Los estudios sobre el comportamiento financiero de los individuos o familias se enmarcan en la literatura denominada "*Behavioral Finance*" traducido como "Finanzas del Comportamiento" o "Finanzas Conductuales". También se utiliza el término "*Household finance*" para referirse expresamente a las "Finanzas de las familias", "Finanzas de los hogares" o Comportamiento financiero de los hogares".

Las finanzas del comportamiento surgen en respuesta a las dificultades del paradigma tradicional para explicar algunos acontecimientos en los mercados de valores, asumiendo que los inversores no siempre actúan de forma racional, sino que toman decisiones influidos por sus creencias, valores, sentimientos y emociones, así como por influencia de otros individuos. Ello ha motivado la aportación de teorías procedentes de otras disciplinas como la psicología y la sociología, por lo que, desde el punto de vista teórico, el comportamiento financiero de los individuos o de las familias ha de ser abordado desde una perspectiva interdisciplinar.

Las finanzas del comportamiento analizan la influencia de las variables psicológicas y sociológicas sobre las decisiones financieras de los individuos, tratando de estudiar "cómo se comporta en realidad el ser humano ante los problemas financieros, y no como debería comportarse" (Blasco y Ferreruela, 2017:4). En este sentido, las aportaciones de esta rama de las finanzas pueden ser consideradas como un complemento a la teoría financiera clásica, si bien existe un cierto debate en la literatura en torno al papel de las teorías procedentes de la psicología y la sociología. La literatura sitúa el origen de las finanzas conductuales en el trabajo de los psicólogos Kahneman y Tversky publicado en 1979 en el que exponen la *Pospect Theory*, traducido como teoría de las perspectivas, la cual asume que la racionalidad es limitada y que los individuos toman sus decisiones en función de sus sesgos cognitivos y sus emociones.

Cabe destacar que la importancia de la teoría financiera clásica, así como de las finanzas conductuales, se ha visto reflejada en el hecho de que algunos de sus principales exponentes han sido galardonados con el Premio Nobel de Economía. Así, en 1990 se concede conjuntamente el premio Nobel de Economía a Markowitz, Sharpe y Merton por sus trabajos pioneros en la Economía Financiera relativos a la teoría de carteras. En 2002 se concede conjuntamente a Kahneman y Smith, por integrar aspectos de la teoría psicológica en el

estudio del comportamiento económico del ser humano. En 2013 a los economistas Fama, Hansen y Shiller, por su trabajo dirigido a entender cómo se determinan los precios de los activos. En 2017 se otorga a Thaler conocido por sus aportaciones teóricas a las finanzas conductuales y por su colaboración con Daniel Kahneman y otros en la definición avanzada de este campo.

Entre las teorías financieras destacan la Teoría de la Utilidad Esperada (Von Neumann y Morgenstern (1944), la Teoría de los Mercados Eficientes (Fama, 1965), la Teoría de Carteras (Markowitz, 1952) y la Teoría del Ciclo de Vida de los Ahorros (Ando y Modigliani, 1963). Las principales teorías procedentes de la psicología son la Teoría de las Perspectivas (Kahneman y Tversky, 1979), la Teoría del Comportamiento Planeado (Ajzen, 1991) y la Teoría Socio-Cognitiva (Bandura, 1986). Por último, la Teoría de Roles (Eagly, 1987) y la Teoría de la Socialización (Harris, 1995) son las principales aportaciones desde la sociología. Por último, dada la importancia de las nuevas tecnologías como herramientas de información, así como para la realización de operaciones financieras, se considera también el modelo de aceptación de la tecnología (TAM), propuesto por Davis et al. (1989).

Los estudios precedentes sobre finanzas personales y familiares se han realizado sobre la base de encuestas, las cuales se pueden agrupar en encuestas de competencias financieras y encuestas financieras a familias. Entre las primeras destaca la *International Survey of Adult Financial Literacy Competencies* (Encuesta sobre *Financial Literacy* a adultos), elaborada por la OCDE en 30 países y economías que ha recogido datos de 51.650 adultos entre 18 y 79 años. En España se ha desarrollado una iniciativa por parte del Banco de España en colaboración con la Comisión Nacional del Mercado de Valores, dentro del Plan de Educación Financiera, mediante la cual se ha realizado una Encuesta de Competencias Financieras entre el cuarto trimestre de 2016 y el segundo de 2017 con objeto de medir las competencias financieras de la población adulta en España. Esta encuesta, publicada en 2018, contiene información de 8.554 individuos, ha sido utilizada en el presente estudio para analizar la *financial literacy* en España. Del mismo modo, el Informe Pisa evalúa los conocimientos de los jóvenes de 72 países a la edad de 15 años para conocer sus conocimientos y competencias al final de su etapa de educación obligatoria con carácter trianual. En la encuesta realizada en el año 2012 se incluye por primera vez un módulo referente a las competencias financieras de estos alumnos que ha generado un gran interés entre la comunidad científica.

Otra de las encuestas utilizada en el presente estudio es la Encuesta Financiera de las Familias, la cual también es elaborada por el Banco de España. Esta es de carácter trienal siendo la última disponible la correspondiente a 2014, si bien ha sido publicada a finales de 2017. La EFF-2014 está compuesta por 6.120 hogares que dan respuesta a preguntas que abarcan desde aspectos sociodemográficos hasta los hábitos financieros de los individuos. Esta encuesta ha sido utilizada como base para el estudio de la tolerancia al riesgo y el uso de la banca online en España. En base a la información facilitada en esta encuesta se ha analizado la tolerancia al riesgo financiero de las familias españolas, así como el uso de la banca online. Encuestas similares son la italiana *Indagine sui Bilanci delle Famiglie*, la estadounidense *Survey of Consumer Finances* (SCF) o la australiana *Household, Income and Labour Dynamics* (HILDA).

Por último, en este capítulo se muestran los principales trabajos analizados que han utilizado alguna de las encuestas realizadas a los hogares respecto a su comportamiento financiero. Los temas objeto de estudio abarcan una amplia gama de temas. Así, se ha estudiado la riqueza de los hogares, la inversión en acciones, la vivienda y el mercado hipotecario, las restricciones crediticias, el endeudamiento de las familias, la medida de la *financial literacy*, la actitud ante el riesgo o el uso de la banca online, la incidencia del género, o el empleo.

Capítulo 2. Financial literacy en España. Especial referencia al género

En el segundo capítulo se presenta el estudio relativo a la *financial literacy* (en adelante, FL) en España, el cual tiene un doble objetivo: medir el nivel de FL en España y determinar los factores que contribuyen a explicar la misma. Es de señalar que, a diferencia de muchos de los estudios previos que asocian la FL exclusivamente a los conocimientos financieros, en el presente trabajo se sigue la definición de la OCDE. Según este organismo, la FL es "una combinación de conocimientos, habilidades, actitudes y comportamientos necesarios para tomar buenas decisiones financieras y, en última instancia, adquirir el bienestar financiero individual" (OECD, 2011: 3).

En el marco teórico de las Finanzas Personales o Finanzas del Comportamiento, se plantea un conjunto de hipótesis relativas a los factores socio-demográficos y económicos que contribuyen a explicar la FL, con especial referencia al género. El estudio se ha realizado a partir de la información proporcionada por la Encuesta de Competencias Financieras (ECF) realizada por el Banco de España, la cual se publica por primera vez en 2018. La muestra

final está integrada por 8.261 individuos que han respondido a las preguntas necesarias para elaborar dicho índice, así como a las variables explicativas de la FL. En base a la metodología propuesta por la OCDE (2013, 2017), se ha construido un índice de FL a partir de tres subíndices relativos a los tres aspectos que conforman la FL: conocimiento financiero, comportamiento financiero y actitud hacia el ahorro.

Con objeto de contrastar las hipótesis relativas a la incidencia de los aspectos socio-demográficos y económicos de las familias, se procede a la estimación de diferentes modelos econométricos. Los resultados obtenidos sobre una muestra de 8.261 individuos extraída de la ECF-2016, permiten concluir que el nivel de FL en España es aceptable y se sitúa en torno a la media de los países de la OCDE, sobre todo en lo relativo al nivel de conocimientos financieros. Además, presentan una capacidad adecuada de gestionar sus finanzas personales, y una buena actitud ante el ahorro. Los resultados obtenidos mediante un análisis de regresión muestran una relación positiva entre el nivel de FL y un alto nivel de estudios, el nivel de ingresos y el hecho de estar casado o cohabitar con su pareja. El grupo de edad entre 55 y 64 años es el único significativo y con signo positivo con el índice y todos los subíndices. En cuanto al efecto moderador de las restantes variables en la relación mujer-FL se observa que las mujeres con estudios superiores mejoran su nivel de FL, mientras que dicho nivel se reduce en el caso de mujeres casadas o que viven en pareja.

Es de señalar que, en la mayor parte de los estudios previos, la comparación a nivel internacional se realiza a partir de indicadores de FL basados exclusivamente en los conocimientos financieros. En este sentido, los resultados obtenidos en el subíndice de conocimiento financiero son acordes a los encontrados en estudios precedentes. Además, al considerar los distintos componentes de la FL, se observan ciertas diferencias, lo cual revela la importancia de distinguir entre los distintos aspectos que definen la FL, siendo relevante para efectuar comparaciones a nivel internacional. Concretamente, los resultados obtenidos en relación con el género revelan la importancia de considerar los diferentes aspectos de la FL, así como la interacción con otros factores.

Capítulo 3. Tolerancia al riesgo financiero de las familias en España

En el tercer capítulo se analiza la tolerancia al riesgo financiero de las familias españolas con especial referencia al género. Este es un tema de creciente interés entre la comunidad científica ante la incertidumbre existente por el futuro del sistema de pensiones, unido a la

aversión al riesgo de los individuos, lo que limita la rentabilidad de sus inversiones financieras.

El objetivo de este trabajo se centra en determinar la incidencia de los factores económicos y sociodemográficos en la tolerancia al riesgo de las familias en España, con especial referencia al género. En el marco teórico de las finanzas del comportamiento, finanzas personales o finanzas de las familias, se propone un conjunto de hipótesis que relacionan las características socio-demográficas y económicas con la tolerancia al riesgo en la adopción de decisiones financieras. La contrastación de las mismas se realiza sobre una muestra de 2.093 observaciones obtenidas de la Encuesta Financiera de las Familias (EFF) correspondiente al año 2014, última disponible hasta la fecha.

Para medir la tolerancia ante el riesgo se han considerado dos variables. En primer lugar, la tolerancia subjetiva al riesgo (TSR), creada a partir de las respuestas a una pregunta realizada en la EFF respecto a la actitud ante el riesgo de los hogares. En segundo lugar, un índice denominado tolerancia objetiva al riesgo (TOR), creado en base a las posiciones mantenidas por los encuestados de productos financieros, otorgándoles un valor a cada producto en función de su nivel de riesgo financiero. Los productos analizados han sido los depósitos, los bonos, los fondos de inversión y las acciones. Además, se ha creado la variable gap, la cual indica la coherencia entre la actitud que manifiestan ante el riesgo financiero y el riesgo que asumen realmente al adquirir productos financieros.

Para este estudio se utiliza una muestra de 2.093 individuos con capacidad para ahorrar e ingresos anuales superiores a 12.000 euros, extraída de la EFF-2014., última disponible hasta la fecha. Los resultados permiten concluir que la propensión a asumir riesgos por parte de las familias en España es muy baja, solo un 30% de los individuos encuestados, manifiestan su actitud favorable a asumir algún riesgo en la contratación de productos financieros. Sin embargo, al analizar la cartera de inversiones financieras, se aprecia que un 45% de los encuestados tiene acciones siendo este el producto más arriesgado considerado en el presente estudio. Ello ha revelado la existencia de un gap entre la actitud ante el riesgo y la asunción real de riesgos.

Los resultados obtenidos permiten observar que las mujeres y los individuos casados o que viven en pareja, presentan una menor tolerancia al riesgo, mientras que los individuos con mayor edad, mayor nivel educativo, así como los que cuentan con mayores ingresos, se

muestran más dispuestos a asumir riesgos financieros. No obstante, las mujeres con mayor edad, así como las mujeres con mayores ingresos, presentan una mayor propensión a asumir riesgos en sus decisiones de inversión financiera (TOR), si bien las mujeres casadas reducen su tolerancia a dicho riesgo.

Capítulo 4. Nivel educativo y banca online en España

En el capítulo cuatro se analiza el uso de la banca online en España, el cual aborda el tema de las nuevas tecnologías como canal de comercialización y de información para los usuarios. En este estudio se hace mención a los cambios producidos en el sector bancario en España durante la última década. Se trata de un sector que ha cambiado mucho desde la recesión mundial que se ha producido a partir de 2008 y que se ha transformado profundamente mediante la concentración de entidades financieras, el cierre de oficinas y el proceso de digitalización de las entidades que han sobrevivido a este período. Desde que en 1.967 fuera introducido el primer cajero automático por Barclays Bank, el sector bancario ha invertido muchos recursos en la utilización de canales autoservicio. Este hecho, unido al incremento en el número de usuarios de internet a nivel global, ha propiciado un aumento del número de usuarios de estos canales, con el consiguiente ahorro de costes para entidades financieras y clientes.

El estudio se centra en el análisis de los determinantes del uso de la banca online en España, con especial referencia al nivel educativo. Las hipótesis relativas a la incidencia del nivel educativo y otros factores socio-demográficos y económicas en el uso de la banca online, se contrastan sobre una muestra de 4.300 observaciones obtenidas a partir de la Encuesta Financiera de las Familias de 2014.

Los resultados obtenidos muestran que los hombres, con estudios superiores, así como con mayores ingresos, los que trabajan por cuenta propia, los que hacen un mayor uso de las tarjetas de crédito, de los cajeros automáticos y realizan operaciones bancarias con mayor frecuencia, son los más propensos a usar la banca online. Por el contrario, los individuos de mayor edad reducen el uso de la banca por internet en relación con los más jóvenes. Cuando se analiza la interacción entre el nivel educativo y el resto de variables, se observa que la conjunción de un mayor nivel de estudios con una mayor edad, así como con mayores ingresos, reducen el uso de la banca online. Por el contrario, loa hombres con estudios de

bachiller utilizan más los servicios de la banca por internet que los hombres con menor nivel de estudios.

Los resultados revelan que la banca online tiene capacidad de ser utilizada por un mayor número de usuarios en España, especialmente entre algunos colectivos específicos como las mujeres o las personas de mayor edad. Por otro lado, el hecho de que los individuos con un elevado nivel educativo y altos ingresos reduzcan el uso de la banca online indica que este tipo de clientes prefiere un asesoramiento personalizado para la contratación de productos financieros más complejos.

Cabe destacar que este trabajo ha sido publicado en el número 22 (2019) de la revista *Journal of Behavioral and Experimental Finance*, la cual está indexada en SCOPUS, y situada en el segundo cuartil en la categoría de Finanzas en 2017, ocupando la posición 80 de 259.

Conclusiones

En cuanto a los factores explicativos del comportamiento financiero, a lo largo de la tesis se han expuesto detalladamente los resultados obtenidos en cada uno de los trabajos, por lo que para concluir se ha optado por sintetizar dichos resultados de forma transversal, haciendo referencia a los tres estudios simultáneamente. Ello es posible, ya que, los tres estudios tienen en común que en todos ellos se trata de explicar la incidencia de los factores socio-demográficos y económicos en el citado comportamiento. Estos factores son el género, el nivel educativo, la edad, el estado civil y los ingresos. Otro aspecto común a los tres estudios es que en todos se hace especial referencia al efecto moderador de las citadas variables en la relación entre género y FL o entre género y tolerancia al riesgo, o sobre la relación entre el nivel educativo y el uso de la banca online. De ahí que es posible extraer algunas conclusiones sobre la incidencia de dichas variables en los distintos aspectos del comportamiento analizados.

En primer lugar, en la presente tesis, partiendo de los supuestos de la teoría de roles sociales, se ha prestado especial atención al género. Así, se ha encontrado que la mujer presenta una menor FL que los hombres, si bien este efecto se ve reducido cuando la mujer tiene estudios superiores, aunque también se ve potenciado en las mujeres casadas. Así mismo, la mujer tiene una menor tolerancia al riesgo, aunque es más coherente entre su actitud o propensión subjetiva y su comportamiento cuando realiza inversiones financieras. Por último, la mujer tiene una menor propensión a utilizar la banca online.

Otras de las variables relevantes en el presente trabajo son el nivel educativo y el nivel de ingresos. En general, se ha observado que, como era previsible, un mayor nivel de estudios, así como de ingresos, mejora la FL, así como la propensión a asumir riesgos financieros y a utilizar la banca online. En cuanto a la edad, los resultados obtenidos en los tres trabajos ofrecen apoyo a la teoría del ciclo de vida de los ahorros, la cual predice que los individuos tienen diferentes comportamientos financieros a lo largo de su vida. Por último, el estado civil, concretamente estar casado o vivir en pareja mejora la FL, si bien la reduce en el caso de las mujeres casadas, reduce la propensión a asumir riesgos, sobre todo en las mujeres, y no es relevante en el uso de la banca online.

De este modo, la presente tesis contribuye a la literatura sobre comportamiento financiero de las familias, ya que, hasta dónde alcanza nuestro conocimiento, el primer trabajo replica un índice de FL propuesto por la OCDE inédito hasta la fecha en España. El segundo trabajo mide la propensión al riesgo de los hogares españoles en lo referente a la inversión financiera distinguiendo entre la tolerancia subjetiva y objetiva, lo cual no ha sido analizado en estudios previos referidos a España. Así mismo, el estudio relativo a la banca online es el primero que analiza la incidencia de la educación y el resto de determinantes socio-demográficos en el uso de la banca online en España. Por tanto, la presente tesis proporciona nuevas evidencias sobre el comportamiento de los hogares españoles en cuanto a sus competencias financieras, su propensión al riesgo y al uso de la banca online. Estos tres aspectos pueden ser de utilidad tanto para reguladores al conocer las carencias de los hogares en cuanto a conocimiento y comportamiento financiero, como para entidades financieras que decidan centrarse en aquél segmento de cliente que sea más propenso a contratar ciertos productos (siguiendo los criterios de riesgo de los individuos o sus hábitos financieros) o a utilizar canales menos costosos de comercialización como la banca online.

En cuanto a las implicaciones prácticas, se puede señalar que las instituciones que deseen incrementar el nivel de FL en España podrían centrarse en mujeres, con bajos niveles de estudios y de ingresos, con edad inferior a los 55 años, y que no viven en pareja, como colectivos más propensos a mantener un bajo nivel de FL y con mayor recorrido de mejora. Las mujeres casadas, con menos ingresos y menor nivel de estudios serían los colectivos que más se beneficiarían de una formación específica en materia de actitud ante el riesgo. El incremento de la esperanza de vida, la incertidumbre en el futuro del sistema de pensiones y

la menor rentabilidad histórica que ofrecen los productos de inversión más conservadores podría contribuir a que resultara aconsejable la asunción de mayores riesgos financieros a la espera de obtener mayores rentabilidades futuras. Con el objetivo de intentar paliar esas desigualdades entre géneros y entre los diversos colectivos analizados, una formación específica en esta parcela o la inclusión de una asignatura de Economía en el currículo de la educación secundaria obligatoria podría servir para equilibrar los resultados mostrados por cada colectivo.

En el caso de las entidades financieras, si estas desearan dirigirse a un segmento de clientes con mayor nivel de FL deberían centrarse en individuos con rentas altas, con una edad comprendida entre 55 y 64 años, estudios superiores y hombres casados, ya que estos individuos son más propensos a comprender productos financieros más complejos y planificar sus finanzas a largo plazo.

En cuanto a la tolerancia al riesgo, los resultados obtenidos presentan importantes implicaciones para los profesionales del sector financiero, concretamente los asesores y los empleados de banca. Como se ha indicado, la normativa Mifid II exige a los profesionales que comercializan productos financieros conocer el perfil de riesgo de sus clientes. En este sentido, es de vital importancia para estos profesionales, tener en cuenta la posible discrepancia entre las respuestas referidas a la actitud ante el riesgo y las decisiones de inversión adoptadas. Los resultados del presente estudio permiten no solo elaborar un perfil de los inversores en cuanto su actitud objetiva o su predisposición subjetiva al riesgo, sino también detectar las características que definen a los individuos con mayor propensión a incurrir en el citado gap. Concretamente, los hombres y los individuos con estudios de bachiller o superiores, tienen una mayor probabilidad de incurrir en el gap que las mujeres o los individuos con menor nivel de estudios. Por tanto, se sugiere a los profesionales financieros prestar especial atención a este tipo de clientes con objeto de evitar reclamaciones posteriores.

En cuanto a la banca online, las entidades financieras españolas interesadas en derivar a sus clientes a la banca por internet deben dirigirse a hombres jóvenes con educación superior, propietarios de negocios, que usan cajeros automáticos y tarjetas de crédito y están acostumbrados a contratar diferentes productos bancarios. Sin embargo, a los individuos con niveles educativos más altos y niveles de ingresos mayores se les debe ofrecer un trato más

personalizado. Se espera que este estudio sea interesante para las instituciones financieras permitiéndoles identificar los segmentos de clientes que pueden ser más rentables.

Por último, señalar que la principal limitación del estudio hace referencia a la fecha de los datos utilizados, sobre todo los referidos a la Encuesta Financiera de las Familias. Uno de los principales problemas con el que se ha encontrado la presente investigación es el retraso con el que se permite el acceso a los investigadores a las bases de datos de dichas encuestas. Concretamente, la última EFF corresponde a 2014 y el acceso a la base se facilitó en noviembre de 2017, después de que el servicio de estudios del Banco de España ya hubiese publicado sus informes sobre la misma. Estas dificultades pueden ser una de las causas de la prácticamente nula aportación de los investigadores académicos precedentes en este campo. Así mismo, como extensión del trabajo, se podría replicar el estudio para otros períodos en el caso de la EFF, al existir las correspondientes a años anteriores, si bien no es fácil realizar estudios de panel debido a la diferente composición de la muestra en cada oleada. Respecto a la ECF, utilizada para el capítulo de FL hay que destacar que se trata de la primera edición de la citada encuesta en España, por lo que los resultados obtenidos no son comparables con datos precedentes, si bien, sí lo son con los de otros países que sí han realizado con anterioridad estos estudios.

REFERENCIAS

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and Human Decision Processes*, 50(2), 179-211

Ando, A. y Modigliani, F. (1963). The life cycle hypothesis of saving: Aggregate implications and tests. *American Economic Review*, 53, 55-84.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Blasco, N y Ferreruela, S. (2017). Behavioral Finance: ¿Por qué los inversores se comportan como lo hacen y no como deberían? Bolsas y Mercados Españoles, Estudios y publicaciones, noviembre, 2-20.

Davis, F. D., Bagozzi, R. P. y Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8), 982-1003.

Encuesta de Competencias Financieras (ECF) 2016. Disponible en: https://www.bde.es/bde/es/areas/estadis/estadisticas-por/encuestas-hogar/relacionados/encuesta-de-comp/

Encuesta Financiera de las Familias (EFF) 2014. Disponible en: https://www.bde.es/bde/es/areas/estadis/estadisticas-por/encuestas-hogar/relacionados/Encuesta_Financi/

Eagly, A.H. (1987). Sex differences in social behavior: A social-rol interpretation. Hillsdale, New Jersey. Lawrence Earlbaum

Fama, E. F. (1965). The behavior of stock market prices. *Journal of Business* 36(4), pp. 34-105.

Kahneman, D. y Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica: Journal of the Econometric Society* 47, 263–291.

Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*,7(1), 77-91.

MiFID, I. I. (2014). Directive 2014/65/EC of the European Parliament and of the Council.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological review*, 102(3), 458.

OECD INFE (2011). Measuring Financial Literature: Questionnaire and Guidance Notes for Conducting an Internationally Comparable Survey of Financial Literacy. Paris: OECD

OECD/INFE. (2013). Toolkit to Measure Financial Literacy and Financial Inclusion: Guidance, Core Questionnaire and Supplementary Questions.

OECD (2017), G20/OECD INFE report on adult financial literacy in G20 countries.

PISA (2012). Informe español, Ministerio de Educación y Formación Profesional. http://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2012.html

Von Neumann, J. y Morgenstern, O. (1944). Theory of Games and Economic Behavior, Princeton University Press, Princeton.

Zagálaz-Jiménez, J.R. y Aguiar-Díaz, I. (2019). Educational level and Internet banking. *Journal of Behavioral and Experimental Finance*, 22, 31-40.

CHAPTER 1.

INTRODUCTION

1.1. INTRODUCTION

The study of the financial behavior of families has generated a growing interest in the academic community, as well as in the professional field and society in general. Firstly, in terms of public administration, it is useful to predict the behavior of families in order to discourage harmful patterns for society as a whole. Initiatives related to financial education to reduce existing inequalities in this area are being managed by the CNMV, the Bank of Spain and the Ministry of Economy, Industry and Competitiveness (Bank of Spain website, 2018). Teaching long-term savings and investment strategies to the population and improving the financial education of individuals can generate well-being for families and financial institutions and place them in a more favorable situation throughout the stages of their life. Secondly, at a regulatory level, investor protection is being encouraged with the entry of the Mifid II regulations in January 2018. On the other hand, the financial are interested in knowing the preferences and attitudes of clients in order to properly guide the use of their products and services.

The sociodemographic changes that are taking place among the population such as the increase in life expectancy, the greater presence of women in higher education, as well as the more widespread incorporation of women into the labor market, present an opportunity to analyze the incidence of these new situations in the financial behavior of households, and in particular the role of women. According to previous studies, women are in a more disadvantaged situation in terms of financial competences, which places them in a situation of financial vulnerability.

In this context, in the theoretical framework of behavioral finance, this thesis focuses on studying the financial behavior of individuals/families in Spain. In this chapter a synthesis of the main theories that contribute to this behavior is explained, as well as a review of previous studies on personal and family finances. Finally, the objectives and the thesis structure is presented, which is integrated by three works. The first is related to financial literacy, the second to the attitude towards financial risk and the third to the use of online banking. The first is based on the Financial Competencies Survey of 2016 and the last two on the Financial Survey of Families in 2014; both surveys are conducted by the Bank of Spain.

1.2. FINANCIAL BEHAVIOR OF FAMILIES. MAIN THEORIES

Studies on the financial behavior of individuals or families are framed in the literature called "Behavioral Finance". The term "Household Finance" is also used to expressly refer to family financial patterns.

In principle, behavioral finance applies the concepts of economics and finance to the management of the financial resources of individuals and families. In this sense, traditional financial theory is based on the hypothesis of market efficiency and the rationality of investors, who try to maximize their utility. However, empirical evidence has challenged both principles, showing that markets are not always efficient and that individuals sometimes adopt irrational behaviors. Behavioral finances arise in response to the difficulties of the traditional paradigm to explain some events in the stock market, assuming that investors do not always act rationally, but make decisions influenced by their beliefs, values, feelings and emotions, as well as due to the influence of other individuals. This has prompted the contribution of theories from other disciplines such as psychology and sociology, so, from the theoretical point of view, the financial behavior of individuals and families has to be approached from an interdisciplinary perspective.

In this sense, the analysis of behavioural finances explores the influence of psychological and sociological variables on the financial decisions of individuals, trying to study "how the human being behaves in reality before financial problems, and not how he should behave" (Blasco and Ferreruela, 2017:4). In this way, the contributions of this branch of finance can be considered as a complement to classic financial theory, although there is some debate in the literature about the role of theories coming from psychology and sociology, since the defenders of classical financial theory do not accept the approaches of these other disciplines.

The literature places the origin of behavioral finance in the work of psychologists Kahneman and Tversky published in 1979 in which they expose the prospect theory, which assumes that rationality is limited and that individuals take their decisions based on their cognitive biases and their emotions.

It should be noted that the importance of classical financial theory, as well as behavioral finance, has been reflected in the fact that some of its main exponents have been awarded

the Nobel Prize in Economics[1]. Thus, in 1990, the Nobel Prize in Economics was awarded to Markowitz, Sharpe and Merton for their pioneering work in Financial Economics related to the portfolio theory. In 2002 it was granted jointly to Kahneman and Smith, for integrating aspects of psychological theory in the study of the economic behavior of the human being. In 2013 it was awarded to the economists Fama, Hansen and Shiller, for their work aimed at understanding how the prices of assets are determined. In 2017, Thaler has been recognised for his theoretical contributions to behavioral finance and for his collaboration with Daniel Kahneman and others in the advanced definition of this field.

Among the financial theories included are the Theory of Expected Utilities (Von Neumann and Morgenstern (1944), the Theory of the Efficient Markets (Fama, 1965), the Theory of Portfolios (Markowitz, 1952) and the Theory of the Life Cycle of Savings (Ando and Modigliani, 1963). The main theories coming from psychology are the Prospect Theory (Kahneman and Tversky, 1979), the Theory of Planned Behavior (Ajzen, 1991) and the Socio-Cognitive Theory (Bandura, 1986). Finally, the Theory of Roles (Eagly, 1987) and the Theory of Socialization (Harris, 1995) are the main contributions from sociology. Given the importance of new technologies as tools of information and for the execution of financial operations, the technology acceptance model (TAM), proposed by Davis et al. (1989), is also considered, followed by a brief synopsis of the aforementioned theories.

1.2.1. Financial theories applied to the study of the financial behavior of individuals/families

Financial theory, according to personal finance, is based on the theory of expected utility, the theory of efficient markets, the theory of portfolios and the theory of the life cycle of savings.

Theory of expected utility

The theory of expected utility, proposed by von Neumann and Morgenstern (1944), states that individuals make their decisions in order to obtain the maximum possible profit or

[1] It should be noted that the Nobel Prize for Economics was not created by Alfred Nobel, but by the Bank of Sweden in 1969, with the name of "Award of Honor of the Bank of Sweden in Economic Sciences in Memory of Alfred Nobel".

benefit. It is based on the utility function, which is given by a set of alternatives between which a relationship of indifference and a preference relation is defined for an individual who must make a decision. It measures the degree of satisfaction of an economic agent according to different levels of risk. According to this theory, preferences for risk can be modelled by a utility function, with the individual being adverse to risk if this function is concave, prone to risk if the function is convex and neutral in respect to risk if the function is linear. According to Rabin (2000), the utility function generally has a concave shape in relation to wealth, that is, the very poor and the very rich are more adverse than households with an average wealth.

The Theory of Efficient Markets

The theory of efficient markets, proposed by Fama (1965), argues that market prices reflect all the information available at a given time, given the inexistence of transaction costs and the ability to access all the available information without cost. However, the author himself admits that different levels of efficiency can be noted. Thus, weak efficiency implies that the relevant information is contained in the historical prices of the shares. Intermediate efficiency occurs when, in addition to historical prices, there is public information that contributes to the construction of prices. Strong efficiency occurs when investors have all the public and private information relevant to estimate the intrinsic value of the titles. This implies that no investor could beat the market.

Numerous studies have analyzed the efficiency of the stock market and there is a certain consensus around an intermediate level of efficiency. Numerous "anomalies" have been detected (e.g., the January effect, weekends, etc.), which question some of the principles on which this theory is based. In this sense, behavioral finances attempt to explain these anomalies as biases caused by psychological aspects of investors.

Portfolio Theory

The theory of portfolios proposed initially by Markowitz (1952), was developed by the contributions of Sharpe (1964), Litner (1965) and Mossin (1966), who formulate the Financial Assets Valuation Model, known by its acronym, CAPM.

Markowitz's portfolio theory is based on the idea that the behavior of an investor is characterized by its degree of risk aversion and the degree of profit maximization that it expects to obtain, that is, by a combination of yield and risk. Investors can be classified

into three types based on their risk aversion: adverse, prone or risk neutral. The main contribution of the theory of portfolios is that while the performance of a portfolio is given by the average of the returns of the assets that constitute it, the risk can be reduced through an adequate diversification. It is assumed that investors adopt a rational behavior, that is, they prefer a portfolio that offers the maximum return for a level of risk or a portfolio that offers the minimum risk for an expected return.

The life cycle theory of savings

This theory, initially proposed by Ando and Modigliani in 1963, is based on the premise that a person consumes a constant percentage of their income during their life cycle, they are born without an inheritance in their favor and they die without leaving a legacy. This model helps to understand the financial behavior and the propensity to risk of individuals based on their age, as well as their income, since it is foreseeable that, in the first years of their working life, the income will be lower. This model has been applied to the study of financial behavior by Hanna et al. (1995), Bloom et al. (2003) and Börsch-Supan et al. (2015), among others.

1.2.2. Psychological theories applied to the study of the financial behavior of individuals / families

Among the main theories or models contributed by psychology to the study of the financial behavior of individuals or families are the prospect theory (Kahneman and Tversky, 1979), the theory of planned behavior (Ajzen, 1991) and social cognitive theory. (Bandura, 1986).

Prospect Theory

The prospect theory was proposed by Kahneman and Tversky in 1979 and extended by the authors themselves in a later work of 1992. These authors show that individuals have different attitudes towards profits and losses, and that in general, they have a greater sensitivity to loss. Unlike classical financial theory based on the principle of rationality, the prospect theory is based on limited rationality. For example, in relation to the selection of portfolios, this theory holds that "investors think of their portfolios as a collection of separate components instead of an integrated entity" (Blasco and Ferreruela, 2017: 5).

In contrast to the theory of expected utility, the prospect theory suggests that subjective factors interfere in decision making, which implies a deviation from rational behavior arising a set of anomalies called cognitive biases. Kahneman and Tversky (1979) identify several biases related to financial decision-making, such as the over-confidence bias, the lack of self-control bias, the status quo bias, etc. For example, overconfidence involves overestimating one's decision-making ability, self-control means that investors prefer to consume today rather than save for the future, while status quo refers to the preference to stay in the comfort zone of the investor rather than face change (Blasco and Ferreruela, 2017).

Theory of Planned Behavior

The theory of planned behavior (Ajzen, 1991) emerges as an extension of the theory of reasoned action proposed by Ajzen and Fishbein (1980). This starts from a socio-psychological approach according to which the behavior of an individual is determined by the intention to perform a behavior, which is influenced by subjective attitudes and norms. The attitude corresponds to the feelings of a person, while the subjective norms refer to the feelings of family members, friends and colleagues about the behavior of the individual.

From a psychological point of view, the theory of planned behavior (Ajzen, 1991) argues that the intention to perform a behavior can be predicted very closely by attitudes towards that behavior, subjective norms and by the perceived control over that behavior. Thus, this theory can also be useful when measuring individuals' attitude to risk. Among the preceding studies that have used this theory in the area of consumer behavior are Lusardi and Mitchell (2008), Xiao et al. (2011) and Koropp et al. (2014).

Socio-Cognitive Theory

The socio-cognitive theory (Bandura, 1986), initially called the Social Learning Theory, is based on the assumption that human behavior is influenced by the social environment. This theory states that the behavior of individuals arises from an interaction between personal factors (knowledge, expectations, attitudes and beliefs), environmental factors (resources, physical conditions, consequences of actions) and behavioral factors (individual actions, choices and verbal statements). According to the socio-cognitive theory, each individual must assess the results or consequences that he believes will occur

as a result of carrying out a behavior or action. In this way, "perceived self-efficacy plays a fundamental role in socio-cognitive theory because it affects action not only directly, but through its impact on other determining factors" (Bandura, 1991, 1999: 28). Among the applications of this theory to financial behavior are the works of Tran and Von Korflesch (2016), Estelami (2016) and Papastamou et al. (2018).

1.2.3. Sociological theories applied to the study of the financial behavior of individuals / families

Sociological theories are primarily concerned with studying the behavior of the human being and identifying how the norms established by the community influence the relationships between individuals in society. Among the most applied sociological theories to the study of financial behavior are the theory of roles (Eagly, 1987) and the theory of socialization (Harris, 1995); both provide interesting arguments regarding gender differences.

Theory of Social Roles

Role theory is formally proposed by Alice Eagly in the book entitled "Sex differences in social behavior: A social-role interpretation" (1987), although in several previous works she had already begun to deal with gender differences in social behavior (Eagly, 1978, 1983; Eagly and Wood, 1982). In the prologue of the former 1987 book, the author comments that the studies on gender differences in the 70's are carried out fundamentally by psychologists while their approach is eminently social. Specifically, Eagly (1987: 3) states: "I have based myself on certain concepts provided by social role theory and theories of social influence ... However, the general emphasis of this analysis is on the person as a recipient of social pressures, even if he is a person who actively collaborates to create and react to these pressures ". Her approach is based on examining differences in the social position of the sexes and argues that these differences expose women and men to expectations of systematically different roles. In addition, it interprets gender differences in social behavior in terms of a single socio-normative perspective.

Finally, with respect to the term gender versus sex, Eagly (1987) argues that "the term gender refers to the meanings that societies and individuals attribute to feminine and masculine categories ... That is, to the social roles that a society defines for women and men as gender roles and the stereotypes that people have about women and men as gender

stereotypes. These concepts are adequately defined in terms of the meanings attributed to the sexes "(p.6).

In short, social role theory holds that human behavior is guided by both the expectations of individuals and the expectations of other people. Therefore, if we know the role of that person in society, a significant part of their behavior can be foreseen. The origin of the behavior of men and women derives from the physical differences between sexes. On the one hand, the reproductive capacity of women and, on the other hand, the greater size and strength of men and the interaction of these factors with the social and economic demands of the environment (Wood and Eagly, 2002).

Thus, knowing the historical role of women at home (currently in the process of change), one would expect that women had a more conservative financial behavior in general, which is more adverse to risk and change, as well as lower financial competences. However, in industrialized societies this division of labor and this hierarchy of roles is becoming increasingly weak, either because of the decrease in birth data or because of the decrease in the use of physical force in jobs (Wood and Eagly, 2012). Among the studies that have applied this theory to the study of financial behavior are Eagly (2001), Edwards et al. (2007) and Gudmunson and Danes (2011).

Theory of Socialization

The theory of socialization is based on three principles: 1) social interaction is the basic element of the creation of the personality, 2) the family is a decisive link in the process of socialization and 3) social roles are the key link between the individual and society. In addition, socialization is a continuous process that is maintained throughout life, and is characterized by the imposition of social models. The means of socialization are varied: the family, the school, the media and reference groups (e.g., those linked to the profession) (Lucas, 1986). One of the most cited works in the literature in relation to the theory of socialization is Harris (1995), which analyzes the role of parents in the socialization of children, as well as agents outside the family (e.g., Harris, 1995). On the other hand, the theory of socialization starts from the premise that the differences in the socialization between genders, which is largely linked to work, transfers these differences to the financial behavior of households. Traditionally, large differences have been found in the financial behavior of men and women, with the former being more prone to take greater risks (Miller and Stark, 2002).

Technology Acceptance Model

The Technology Acceptance Model (known as TAM) is used to explain the behavior in the use of technologies by individuals and is based on the theories of Davis et al. (1989), in which it is considered that there are two beliefs that encourage the use of technology by individuals which are: the perceived utility and the perception of ease of use. The use of technology will also depend on the attitude towards the use that the individual has and the intention that he has to use it. Among the applications of this theory are works by Venkatesh and Davis (2000), Pavlou (2003) and Legris et al. (2003); all of them relate to the determinants of the use of technology.

In table 1.1 a synthesis of the main theories that have contributed to explain the financial behavior of individuals or families is presented.

Table 1.1. Main theories about the financial behavior of individuals or families

Theory	Assumptions	Implications	Authors
Financial theories			
Expected Utility Theory	The purpose of individuals is to obtain maximum utility or benefit from their decisions. In general, the function is concave.	Very poor and very rich individuals are more risk adverse than households with average wealth.	von Neumann y Morgenstern (1944)
Theory of Efficient Markets	The prices of the securities reflect the relevant information.	If the market is efficient, it is not possible to beat the market.	Fama (1965)
Portfolio Selection Theory	Individuals are rational and risk adverse.	The FB varies according to the individuals' performance-risk preferences.	Markowitz (1952)
Life Cycle Model of Savings	Individuals consume a constant percentage of their income throughout their life cycle.	The FB varies depending on the age of the individual.	Ando y Modigliani (1963)
Psychological theories			
Prospect theory	The rationality of investors is limited and they have a greater sensitivity to losses.	Individuals have cognitive biases in making financial decisions.	Kahneman y Tversky (1979,1992)
Theory of Planned Behavior	Try to predict and understand human behavior.	Decisions may be influenced by attitudes, subjective norms and perceptions of behavior control.	Ajzen (1991)
Socio-Cognitive	Changes in behavior are affected by environmental influences and personal factors.	The FB is influenced by its environment (parents, peers and society), as well as previous personal experiences.	Bandura (1986)
Sociological theories			
Social Roles Theory	Individuals have certain roles assigned by society, which vary according to gender.	The FB varies according to the sex of the person.	Eagly (1987)
Socialization Theory	The acquisition of knowledge, skills and values of an individual depend on their interaction with other members of society.	The FB depends on the socialization of the individual.	Harris (1995)
Technology Acceptance Model (TAM)	The use of technology depends on the perception of the individual.	Individuals use technology if it is useful and easy to use.	Davis et al. (1989)

FB: Financial Behavior

Source: own elaboration from Ozmete and Hira (2011)

1.3. PRECEDENT STUDIES ON PERSONAL AND FAMILY FINANCES

Previous studies on personal and family finances have been conducted on the basis of surveys, which can be grouped into financial competence surveys and family financial surveys. Among the first, the International Survey of Adult Financial Literacy Competencies, prepared by the OECD in 30 countries and economies, has collected data of 51,650 adults between 18 and 79 years old. An initiative has been developed by the Bank of Spain in collaboration with the National Securities Market Commission, within the Financial Education Plan, through which a Financial Competencies Survey was conducted between the fourth quarter of 2016 and the second of 2017 in order to measure the financial competencies of the adult population in Spain, that can be compared with a wide range of OECD countries.

Similarly, the Pisa Report assesses the knowledge of teenagers in 72 countries at the age of 15 to evaluate their knowledge and skills at the end of their compulsory education over a three-year basis. In the survey carried out in 2012, a module referring to the financial competences of these students was included for the first time, which has generated great interest among the scientific community.

The main surveys on household financial competencies are presented in Table 1.2.

Table 1.2. Surveys on financial competences

Database	Institution (Country)	Period	Frecuency	Characteristics
International Survey of Adult Financial Literacy Competencies	International Network on Financial Education (OCDE/INFE)	2010-2016	1 year	- 51650 adults between 18 and 79 years. - 30 countries or economic areas.
PISA Report	OECD	2000-2018	3 years	- 37.205 spanish aged 15 years old. - 537.591 students in total. - 72 countries. - Maths, science and reading plus a fourth competence.
Survey of Financial Competences	Bank of Spain and National Securities Market Commission	2018	Unknown	- Adults between 18 and 79 years. - Regional segmentation. - Sample of 8,554 individuals.

Source: own elaboration

The oldest of the Family Financial Surveys is that of the Bank of Italy, which dates back to 1977, nevertheless it is a common study tool among various OECD economies such as the US, the Netherlands, Australia and Spain. The frequency of these surveys varies between 1 and 3 years and with the exception of the Survey of Consumer Finances (SCF) shows stable panel data. In general, the surveys are carried out by the central banks of each country, although, in the case of Australia, this study is carried out by the University of Melbourne. Table 1.3 shows the main characteristics of the financial surveys of families analyzed.

Table 1.3. Financial Surveys to Families

Database	Institution	Period	Frecuency	Characteristics
Indagine sui Bilanci delle Famiglie (IBF)	Bank of Italy	1977-2014	2 years	- Geographic distribution of households. - Stable panel data. - Sample of about 8,000 families.
Survey of Consumer Finances (SCF)	Federal Reserve (USA)	1983-2016	3 years	- Oversampling of richer households. - Cross-sectional data. - Sample between 4,500 and 6,500 homes.
De Nederlandsche Bank (DNB) Household Survey	De Nederlandsche Bank (Holand)	1993-2018	1 year	- More than 1,500 households. - From 16 years. - Panel data.
Household, Income and Labour Dynamics in Australia (HILDA) Survey	Melbourne Institute (Australia)	2001-2018	1 year	- 17,000 australians and more than 7,000 households. - Panel data.
Family Financial Survey	Bank of Spain	2002-2014	3 years	- Oversampling of richer households. - Stable panel data. - Sample of more than 6,000 families.

Source: own elaboration adapted from Pérez et al. (2016)

Table 1.4 contains a selection of studies based on surveys of financial competencies, which have been used in the main preceding studies on the financial behavior of families. As can be observed, two of the studies are of international scope, referring to OECD countries, specifically those of Atkinson and Messy (2012) and Lusardi (2015). Regarding the studies based on the Pisa Financial Report, Lusardi's (2015) stands out, covering 17 economies belonging to the OECD. Other studies conducted internationally by the Pisa Report, are those of Hospido et al. (2015) which focus on the effect of a Financial Literacy program on secondary school students in Spain and that of Bottazzi

and Lusardi (2016) that carry out a study on the differences in gender with respect to financial competences in Italy.

Table 1.4. Main studies based on financial competence surveys

Authors	Database	Country	Period	Method	Topic
Atkinson and Messy (2012)	International Survey of Adult Financial Literacy Competencies	14 OECD countries	2010-2011	Linear regression	Measure the FL based on the INFE questionnaire.
Agarwalla et al. (2015)	International Survey of Adult Financial Literacy Competencies	India	2011-2012	Ordered logistic regression	Measure FL among young people in India.
Lusardi, (2015)	Pisa Financial Report	17 OECD countries / regions	2012	Review	Conclusions after the first study of the Pisa Financial Report
Hospido et al. (2015)	Pisa Financial Report	Spain	2012	Linear regression	Effect of an FL program on secondary school students
Bottazzi and Lusardi (2016)	Pisa Financial Report	Italy	2012	Linear regression	Gender differences regarding FL in Italy.

Source: own elaboration

Table 1.5 shows the main studies analyzed that have used some of the household surveys regarding financial behavior. In total, there are 13 works, of which 4 have used the Household survey, Income and Labor Dynamics in Australia (HILDA). This is a panel survey initiated in 2001 by the University of Melbourne with funds from the Government of Australia, similar to the Financial Survey of Families (EFF) conducted by the Bank of Spain. As can be seen in the aforementioned table, three of the studies have been conducted on the EFF, and three others with the American Survey of Consumer Finances (SCF); two are based on the Italian survey and one on the survey conducted in the Netherlands. The subjects under analysis cover a wide range of topics. These include the wealth of households, investment in shares, housing and the mortgage market, credit restrictions, the indebtedness of families, the measure of financial literacy, the attitude towards risk or the use of the online banking and the incidence of gender, or employment among others.

Table 1.5. Main studies based on the financial surveys for families

Authors	Data base	Country	Period	Method	Topic
Brunello (2000)	Indagine sui Bilanci delle Famiglie (IBF)	Italy	1995	Linear regression	Relationship between risk aversion and educational level.
Hogarth and Anguelov (2004)	Survey of Consumer Finance	USA	2001	Probit	Relationship between the use of online banking and the management of family finances.
Díaz-Serrano (2005)	Indagine sui Bilanci delle Famiglie (IBF)	Italia	1986-2000	Tobit panel	Relationship between credit restrictions and income uncertainty.
Jianakoplos y Bernasek (2008)	Survey of Consumer Finance	USA	2004	Probit	Family attitude to risk when the woman earns more than the man.
Worthington (2009)	HILDA	Australia	2004	Logit	Use and understanding of the mortgage market in Australia.
Van Rooij et al. (2011)	De Nederlandsche Bank Household Survey	Holand	2005-2006	Factor analysis and Regression	Measurement of FL and participation in the stock market.
West and Worthington (2013)	HILDA	Australia	2010	Correlation analysis	Relationship between attitude to risk and sociodemographic factors.
West and Worthington (2014)	HILDA	Australia	2001-2010	Logit panel	Risk aversion of households based on their macroeconomic experiences.
Bover, 2015	Family Financial Survey (EFF)	Spain	2011	Probit Linear regression.	Relationship between expectations and the evolution of housing prices in Spain.
Barceló and Villanueva (2016)	Family Financial Survey (EFF)	Spain	2002-2008	Regression, panel, Least squares and Instrumental Variables	Response of household wealth to a loss of employment.
Pinilla et al. (2017)	Family Financial Survey (EFF)	Spain	2002-2008	Probit, panel	Relationship between health and occupation of individuals.
George et al. (2018)	Survey of Consumer Finance	USA	2004-2013	Logit, panel	Relationship between gender, tolerance to indebtedness and personal macroeconomic experiences.
West and Worthington (2018)	HILDA	Australia	2001-2010	Longitudinal factor analysis	To create a FL index.

HILDA: Household, Income, Labour Dynamics in Australia

Source: own elaboration from Pérez et al. (2016)

1.4. OBJECTIVES AND STRUCTURE OF THE THESIS

The central theme of this thesis is the study of the financial behavior of families in Spain, specifically analyzing the incidence of socio-demographic characteristics of families in financial literacy, tolerance to financial risk and the use of online banking. To achieve this, starting from the theoretical framework of behavioral finance, each of the works propose a set of hypotheses, which are contrasted from the data obtained from the Survey of Financial Competences and the Financial Survey of Families, both prepared by the Bank of Spain.

The study related to financial literacy has been carried out based on the information provided by the Financial Competencies Survey (ECF) conducted between the fourth quarter of 2016 and the second quarter of 2017 by the Bank of Spain, which was published for the first time in 2018 and consists of 8,554 observations. This survey is the result of the joint work of the Bank of Spain and the National Securities Market Commission and is part of an international financial project coordinated by the OECD International Financial Education Network. The works related to risk tolerance and online banking has been carried out based on the Financial Survey of Families (EFF). This is a triannual survey carried out on Spanish households by the Bank of Spain, which deals with very diverse aspects ranging from sociodemographic issues such as age, sex, marital status or educational level, to the employment status or the financial habits of households. The first corresponds to 2002 and the last available to 2014 (database is published at the end of 2017). The sample is composed of 6,120 families and there is an overrepresentation of households with greater wealth.

In the second chapter the study on financial literacy in Spain is presented, which has a double objective: to measure the FL level in Spain and to determine the factors that contribute to it. In the theoretical framework of behavioral finance, a set of hypotheses related to the socio-demographic and economic factors that contribute to explaining FL are presented, with special reference to gender. The study was elaborated based on the information provided by the Financial Competencies Survey (ECF) conducted between the fourth quarter of 2016 and the second quarter of 2017 by the Bank of Spain, which was published for the first time in 2018. The final sample is made up of 8,261 individuals who have answered the questions necessary to prepare the index, as well as the explanatory variables of the FL. Based on the methodology proposed by the OECD, an

FL index has been constructed from three sub-indexes related to the three aspects that make up the FL: financial knowledge, financial behavior and attitude toward savings. In order to contrast the hypotheses regarding the incidence of the sociodemographic and economic aspects of the families, we proceed to the estimation of different econometric models, whose results are validated through different robustness analyses. The results are discussed in light of the theories and empirical evidence obtained in previous studies. Finally, the conclusions and implications of them are presented.

In chapter 3 the second work is presented, in which the tolerance or propensity to risk of Spanish families is analyzed. The objective of this paper is to determine the incidence of economic and sociodemographic factors on the risk tolerance of families in Spain, with special reference to gender. In the theoretical framework of behavioral finances, personal finances or family finances, a set of hypotheses is proposed that relate the socio-demographic and economic characteristics to the propensity to risk. The contrast of the same is done on a sample of 2,093 observations obtained from the Financial Survey of Families (EFF) for the year 2014, the last available to date. To measure the attitude towards risk, two variables have been considered. First, the subjective tolerance to risk, created from the answers to a question asked in the EFF regarding the attitude towards household risk. Second, an index created in terms of financial products acquired by households that has been called objective risk tolerance. In addition, the gap variable has been created, which indicates the coherence between the attitude families show towards financial risk and the risk they actually assume when purchasing financial products. The obtained results are presented and discussed in light of the theory and previous empirical evidence, and validated with different robustness analyses. Finally, the conclusions and implications are exposed.

The third and final work entitled "Educational level and online banking in Spain" is presented in chapter 4, which addresses the issue of new technologies as a marketing channel and information for users. This study mentions changes in the banking sector in Spain during the last decade. It is a sector that has changed a lot since the global recession that has occurred since 2008 and which has been profoundly transformed by the concentration of financial entities, the closing of offices and the process of digitalization of entities that have survived this period. Since the first ATM in Barclays Bank was introduced in 1967, the banking sector has invested a lot of resources in the use of self-

service channels. This fact, together with the increase in the number of Internet users worldwide, has led to an increase in the number of users of these channels, with consequent cost savings for financial institutions and customers. The study focuses on the analysis of the determinants of the use of online banking in Spain, with special reference to educational level. The hypotheses regarding the incidence of educational level and other sociodemographic and economic factors in the use of online banking, are tested against a sample of 4,300 observations obtained from the EFF-2014. The results present interesting practical implications, especially for financial institutions. It should be noted that this work has been published in number 22 (2019) of the Journal of Behavioral and Experimental Finance. This journal is indexed in SCOPUS, and located in the second quartile, very close to the first quartile (position 67 of 226) in the Finance category in 2017.

In this way, this thesis contributes to the literature on the household financial behavior, since, the first work replicates an FL index proposed by the OECD unpublished to date in Spain. The second paper measures the propensity to risk of Spanish households in relation to financial investment distinguishing between subjective and objective tolerance, which has not been analyzed in previous studies referring to Spain. Likewise, the study of online banking is the first to analyze the incidence of education and the rest of sociodemographic determinants in the use of online banking in Spain. Therefore, this thesis provides new evidence on the behavior of Spanish households in terms of their financial skills, their propensity to risk and the use of online banking. These three aspects can be useful both for regulators when knowing the shortcomings of households in terms of knowledge and financial behavior, and for financial institutions that decide to focus on that segment of the clientele that is more likely to contract certain products (following the criteria of risk of individuals or their financial habits), or to use less expensive marketing channels such as online banking.

REFERENCES

Agarwalla, S. K., Barua, S. K., Jacob, J. y Varma, J. R. (2015). Financial literacy among working young in urban India. *World Development, 67,* 101-109.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and Human Decision Processes*, 50(2), 179-211.

Ajzen, I. y Fishbein, M. (1980). Theory of Reasoned Action. In: Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall.

Ando, A. y Modigliani, F. (1963). The life cycle hypothesis of saving: Aggregate implications and tests. *American Economic Review*, 53, 55-84.

Atkinson, A. y Messy, F. (2012), "Measuring Financial Literacy: Results of the OECD / International Network on Financial Education (INFE) Pilot Study", OECD Working Papers on Finance, Insurance and Private Pensions, 15, OECD Publishing. http://dx.doi.org/10.1787/5k9csfs90fr4-en.

Banco de España (2018). Página Web del Banco de España. https://www.bde.es/bde/es/

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1991). Social cognitive theory of moral thought and action. In W. M. Kurtines y J. L. Gewirtz (Eds.), Handbook of moral behavior and development (Vol. 1, 45–103). Hillsdale, NJ: Lawrence Erlbaum.

Barceló, C., Villanueva, E. (2016). The response of household wealth to the risk of job loss: Evidence from differences in severance payments. *Labour Economics*, 39, 35–54.

Blasco, N y Ferreruela, S. (2017). Behavioral Finance: ¿Por qué los inversores se comportan como lo hacen y no como deberían? *Bolsas y Mercados Españoles*, Estudios y publicaciones, noviembre, 2-20.

Bloom, D. E., Canning, D. y Graham, B. (2003). Longevity and life-cycle savings. *Scandinavian Journal of Economics, 105*(3), 319-338.

Börsch-Supan, A., Bucher-Koenen, T., Coppola, M. y Lamla, B. (2015). Savings in times of demographic change: Lessons from the German experience. *Journal of Economic Surveys, 29*(4), 807-829.

Bottazzi, L. y Lusardi, A. (2016). Gender differences in financial literacy: Evidence from PISA data in Italy. *Global Thinking Foundation, https://institute. eib. org/wp-content/uploads/2016/10/gender-diff. pdf*.

Bover, O. (2015). Measuring expectations from household surveys: new results on subjective probabilities of future house prices. Banco de España. Working Papers, 1535, pp. 361–405.

Brunello, G. (2002). Absolute risk aversion and the returns to education. *Economics of Education Review*, *21*(6), 635-640.

Davis, F. D., Bagozzi, R. P. y Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management science*, *35*(8), 982-1003.

Diaz-Serrano, L. (2005). On the negative relationship between labour income uncertainty and homeownership: Risk-aversion vs. credit constraints. *Journal of Housing Economics*, *14*(2), 109-126.

Eagly, A. H. (1978). Sex differences in influenceability. *Psychological Bulletin*, 85, 86-116.

Eagly, A. H. (1983). Gender and social influence: A social psychological analysis. *American Psychologist*, 38, 971-981.

Eagly, A.H. (1987). Sex differences in social behavior: A social-rol interpretation. Hillsdale, New Jersey. Lawrence Earlbaum

Eagly, A. H. (2001). Social Role Theory of Sex Differences and Similarities. In Encyclopedia of Women and Gender: Sex Similarities and Differences and the Impact of Society on Gender, Editado por Judith Worell. San Diego: Academic Press.

Eagly, A.H. y Wood, W. (1982) Inferred sex differences in status as a determinant of gender stereotypes about social influence. *Journal of Personality and Social Psychology*, 43, 915–928.

Edwards, R., Allen, M. W. y Hayhoe, C. R. (2007). Financial attitudes and family communication about students' finances: The role of sex differences. *Communication Reports*, *20*(2), 90-100.

Encuesta de Competencias Financieras 2016-2017. Banco de España. Página web del Banco de España. https://www.bde.es/bde/es/areas/estadis/Otras_estadistic/encuesta-de-comp/

Estelami, H. (2016). Cognitive drivers of suboptimal financial decisions: Implications for financial literacy campaigns. In *Financial Literacy and the Limits of Financial Decision-Making* (pp. 10-25). Palgrave Macmillan, Cham.

Fama, E. F. (1965). The behavior of stock market prices. *Journal of Business* 36(4), pp. 34-105.

George, E. E., Hansen, M. E. y Routzahn, J. L. (2018). Debt Tolerance, Gender, and the Great Recession. *Journal of Consumer Affairs*, *52*(3), 711-732.

Gudmunson, C. G. y Danes, S. M. (2011). Family financial socialization: Theory and critical review. *Journal of Family and Economic Issues*, *32*(4), 644-667.

Hanna, S., Fan, J. X. y Chang, Y. R. (1995). Optimal life cycle savings. *Financial Counseling and Planning*, 6, 1–15.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological review*, *102*(3), 458.

Hogarth, J. M. y Anguelov, C. (2004). Are families who use e-banking better financial managers? *Journal of Financial Counseling and Planning*, *15*(2), 61-77.

Hospido, L., Villanueva, E. y Zamarro, G. (2015). Finance for all: The impact of financial literacy training in compulsory secondary education in Spain.

Jianakoplos, N. A. y Bernasek, A. (2008). Family financial risk taking when the wife earns more. *Journal of Family and Economic Issues*, *29*(2), 289-306.

Kahneman, D. y Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica: Journal of the Econometric Society* 47, 263–291.

Koropp, C., Kellermanns, F. W., Grichnik, D. y Stanley, L. (2014). Financial decision making in family firms: An adaptation of the theory of planned behavior. *Family Business Review*, *27*(4), 307-327.

Legris, P., Ingham, J. y Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & management*, *40*(3), 191-204.

Litner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets, *The Review of Economics and Statistics*, 47, 13-37.

Lucas, C. J. (1986). Jane Roland Martin. Reclaiming a Conversation: The Ideal of the Educated Woman. New Haven, Conn.: Yale University Press.

Lusardi, A. y Mitchell, O. S. (2008). Planning and financial literacy: how do women fare? *American Economic Review*, *98*(2), 413-17.

Lusardi, A. (2015). Financial literacy skills for the 21st century: Evidence from PISA. *Journal of Consumer Affairs*, *49*(3), 639-659.

Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*,7(1), 77-91.

MiFID, I. I. (2014). Directive 2014/65/EC of the European Parliament and of the Council.

Miller, A. S. y Stark, R. (2002). Gender and religiousness: Can socialization explanations be saved? *American Journal of Sociology*, *107*(6), 1399-1423.

Mosin, J. (1966). Equilibrium in a Capital Asset Market. *Econométrica,* 35, 768-783.

Von Neumann, J. y Morgenstern, O. (1944). Theory of Games and Economic Behavior, Princeton University Press, Princeton.

OECD INFE (2011). Measuring Financial Literature: Questionnaire and Guidance Notes for Conducting an Internationally Comparable Survey of Financial Literacy. Paris: OECD.

OECD/INFE. (2013). Toolkit to Measure Financial Literacy and Financial Inclusion: Guidance, Core Questionnaire and Supplementary Questions.

Papastamou, S., Valentim, J. P., Mari, S. y Marchand, P. (2018). Socio-cognitive elaborations and reactions to economic crisis: Insights from Social Psychology. *International Review of Social Psychology*, *31*(1).

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce*, *7*(3), 101-134.

Pinilla, J.G., López-Valcárcel, B. y Urbanos-Garrido, R.M. (2017). Estimating direct effects of parental occupation on spaniards' health by birth cohort. *BMC Public Health* 17, 26.

PISA (2012). Informe español, Ministerio de Educación y Formación Profesional. http://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2012.html

PISA (2015). Science Framework. *2015-3-14.*

http://www.oecd.org/pisa/pisaproducts/Draft% 20PISA% 202015% 20Science% 20Framework% 20. pdf.

Rabin, M. (2000). Diminishing marginal utility of wealth cannot explain risk aversion. En: Choices, Values, and Frames, Kahneman, D. y Tversky, A. (Eds.), New York: Cambridge University Press.

Sharpe, W.F. (1964). Capital Assets Prices: A Theory of Market Equilibrium Under Conditions of Risk. *Journal of Finance*, 19(3), 425-442.

Tran, A. T. y Von Korflesch, H. (2016). A conceptual model of social entrepreneurial intention based on the social cognitive career theory. *Asia Pacific Journal of Innovation and Entrepreneurship*, 10(1), 17-38.

Tversky, A. y Kahneman, D. (1992) Advances in prospect theory: cumulative representation of uncertainty. *Journal of Risk and Uncertainty* ,5(4): 297–323.

Van Rooij, M. C., Lusardi, A. y Alessie, R. J. (2011). Financial literacy and retirement planning in the Netherlands. *Journal of Economic Psychology*, *32*(4), 593-608.

Venkatesh, V. y Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(2), 186-204.

West, T. y Worthington, A. C. (2013). A Canoncial Correlation Analysis of Financial Risk-Taking by Australian Households. *Consumer Interests Annual*, *59*, 1-4.

West, T. y Worthington, A. C. (2014). Personal attributes and financial risk-taking in Australia. *JASSA*, (1), 25.

West, T. y Worthington, A. C. (2018). Synthesizing an Index of Financial Literacy Using Not-For-Purpose Survey Data. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 331-352.

Wood, W. y Eagly, A. H. (2002). A cross-cultural analysis of the behavior of women and men: implications for the origins of sex differences. *Psychological bulletin*, *128*(5), 699.

Wood, W. y Eagly, A. H. (2012). Biosocial construction of sex differences and similarities in behavior. In *Advances in Experimental Social Psychology*, 46, 55-123. Academic Press.

Worthington, A. C. (2009). The usage and understanding of Australian household mortgages. *International Journal of Housing Markets and Analysis, 2*(4), 347-362.

Xiao, J. J., Ford, M. W., y Kim, J. (2011). Consumer financial behavior: An interdisciplinary review of selected theories and research. *Family and Consumer Sciences Research Journal,* 39(4), 399-414.

CHAPTER 2.

FINANCIAL LITERACY IN SPAIN. FOCUS ON GENDER

2.1. INTRODUCTION

The studies on "Financial Literacy" (hereinafter, FL) are framed in the literature on Financial Behavior, also called Personal Finance, Family Finance, Household Finances or Household Financial Behavior, among others. Personal finances apply the concepts of economics and finance to the management of the financial resources of individuals and families. This branch of finance arises in response to the difficulties of the traditional paradigm to explain some behaviors of investors, who do not always behave rationally, "but they make decisions influenced by their cognitive biases and their emotions" (Blasco and Ferreruela, 2017: 17).

In this sense, research in personal finance has been based on theories from various disciplines, economics, psychology and sociology. These theories include the life cycle theory of savings (Ando and Modigliani, 1963), the prospect theory (Kahneman and Tversky, 1979), the theory of planned behavior (Ajzen, 1991), the socio-cognitive theory (Bandura, 1989), the theory of social roles, especially linked to gender (Eagly, 1987) and the socialization theory (Harris, 1995). On the other hand, the conceptual models used by researchers have considered a wide variety of external and internal factors, as well as socio-economic, personal and family characteristics (Hira, 2009). Each of these factors is related to personal finances and the FL through arguments from different theories, so the theoretical framework is interdisciplinary in its nature. In the current research, special reference is made to the incidence of gender in FL, as well as to the possible moderating effect of other factors in the aforementioned relationship.

The term Financial Literacy has acquired a major role in financial literature since the 1990s, although there is some controversy about its meaning. Thus, some authors associate it exclusively to individuals' financial knowledge, while others consider that in addition to knowledge, the ability to apply such knowledge in making financial decisions must be considered (Huston, 2010). In this sense, FL is acquired not only through education, but also through practice and maintains a strong link with the profile of the family unit and its socio-economic characteristics. According to the OECD (2011: 3), FL is "a combination of knowledge, skill, attitude and behavior necessary to make good financial decisions and ultimately acquire individual financial well-being".

FL has become a growing concern for governments, as well as for international institutions such as the OECD, the International Monetary Fund, the G20 and the

European Commission (Bank of Spain, 2018). Hence, these agencies have decided to invest in the financial education of the population to try to ensure the protection of investors and consumers and strengthen international financial stability (Klapper et al., 2013).

Additionally, to the last global economic recession, which has put many families in financial difficulty, there are other factors such as the changes that are taking place in society with the growth of life expectancy and the improvement in the health of individuals, which increase the importance of financial decision making. According to Arellano et al. (2018), FL contributes to improving the economic behavior and the quality of life of individuals. Since the crisis of 2008, there has been more awareness of the need to deepen the financial education of the population to avoid the errors that destabilize the markets and make individuals more vulnerable (Velecela et al., 2017). Since 2008, the Financial Education Plan has been promoted in Spain through a collaboration agreement between the National Securities Market Commission (CNMV) and the Bank of Spain, which was later joined by the Ministry of Economy, Industry and Competitiveness (Bank of Spain, 2018).

The importance of FL is due to the need for individuals to make financial decisions with complete information, in line with the provisions of the MiFID[1] I regulation dating from November 2007 and more recently with the January 2018 enforcement of the MiFID II regulation, whose main objective is to improve transparency and increase consumer protection.

In their study of FL around the world, Klapper et al. (2015) conclude that in advanced economies (Canada, France, Germany, Italy, Japan, UK and USA), 55% of adults are financial literates, although there are important differences between countries, from 38% in Italy to 68% in Canada. On the contrary, in the emerging economies, the so-called BRICS (Brazil, Russia, India and China), the average is 28%. In Spain, financial competencies have also been measured in the results of a study published in the Pisa Report on Financial Competences (PISA 2015), based on-15 year- old students at the end of compulsory secondary education, and their competencies in science, mathematics, and

[1] MiFID: *Markets in Financial Instruments Directive*.

reading. The results show that the level obtained by Spanish students is below the average of the 15 countries or economies analyzed. However, in their report on the 2016 Financial Competencies Survey on a sample of the adult population, Bover et al. (2018) conclude that the level of financial knowledge is around the OECD average.

Important changes are also being made in education, such as more and more countries including financial education in their curricula. In many cases it is a transversal approach, but in others, it is a specific subject or component in some of the courses of compulsory and post-compulsory secondary education. Even taking into account the cultural differences in education systems, similar aspects are studied in most countries (PISA, 2015).

In gender matter, the role of women in society has undergone an important evolution due to the greater incorporation into the labor market as well as higher education. This has given them a greater autonomy in the adoption of their financial decisions, for which they need to have a higher FL. In this way, according to Arellano et al. (2018), the increase in financial education is needed more specifically in the case of women to help them manage their personal and household finances and allow them access to appropriate financial products and services, as well as entrepreneurial activities.

In this context, the objective of this paper is twofold: to obtain a measure of FL in Spain on the one hand, and on the other hand its determining factors, with special reference to gender. To do this, it has been used the information provided by the Financial Competencies Survey (ECF) prepared by the Bank of Spain for the first time between the last quarter of 2016 and the second quarter of 2017. The final sample consists of 8,261 individuals who have responded to all the issues considered in the construction of the index, as well as the explanatory variables thereof. Based on the information contained therein, and based on the information published by the OECD in 2017, an FL index has been constructed in which the explanatory factors are analyzed.

To our knowledge, this is the first study in which a FL measure obtained in Spain distinguishes between the three components: financial knowledge, financial behavior and attitude towards saving. In addition, studies have focused on the level of knowledge of young people. Thus, Hospido et al. (2015) analyze the impact of specific training in finance on 15-year-old students and García-Aracil et al. (2016) focus on the effect of the environment on the FL of adolescents. Likewise, the study by Arellano et al. (2018),

based on the 2015 PISA Financial report, refers to 15 year-olds who have completed compulsory education. Only the report by Bover et al. (2018) on the Survey of Financial Competencies refers to the adult population, although it is primarily descriptive in character, so there is no global assessment of FL, nor the incidence of economic and socio-demographic variables of joint form.[2]

The chapter is structured in six sections. After the introduction, the second section addresses the concept and assessment of FL, as well as a literature review about the determinants of FL, in order to present the arguments and hypotheses of the study. Next, the methodologic aspects (sample, information sources, variables and estimation method), are presented. The fourth section focuses on the descriptive analysis of the FL index, as well as its components, in Spain. The analysis of the explanatory factors of FL, both globally and for each component, is explained in the fifth section. Finally, in the sixth a discussion of the results is carried out and the conclusions of the study are presented.

2.2. FINANCIAL LITERACY. CONCEPT, MEASURE AND DETERMINING FACTORS

2.2.1. Concept and measure of financial literacy

The general concept of literacy refers to a person's ability to read and write. The idea of literacy has been expanded to various fields such as health or information technology. In the case of financial education, Mason and Wilson (2000: 31), state that "FL is the ability of an individual to obtain, understand and evaluate the relevant information for making decisions, being aware of the financial consequences". For Savoia et al. (2007: 1122), FL is "a process of transmission of knowledge that allows the development of skills in individuals, so that they can make informed and secure decisions, improving the management of their personal finances".

Remund (2010) makes a review of FL studies since 2000 and concludes that the main conceptual definitions of FL fit into five categories: knowledge of financial concepts,

[2] It should be noted that Oympia Bover and Laura Hospido are professionally linked to the Bank of Spain. Specifically, Bover is since 2018, Director of the Department of Structural Analysis and Microeconomic Studies, DG Economy, Statistics and Research and Hospido is Head of the Microeconomic Studies Division of the Microeconomic Analysis Unit.

ability to communicate about financial concepts, aptitude in managing personal finances, ability to make appropriate financial decisions and confidence in effectively planning for future financial needs.

Huston, (2010) considers the existence of two dimensions: personal financial knowledge and its application to personal finances. Therefore, financial knowledge is a dimension of FL, but it is not synonymous with FL. This has an additional dimension of application that implies that an individual must have the confidence and ability to apply their financial knowledge. That is why, when measuring FL, not only should the individual's knowledge be taken into account, but also his/ her capability of using it appropriately (Huston, 2010). The OECD (2011, 2013) adds a third dimension to the concept and considers that FL is based on three pillars: financial knowledge, financial attitude and financial behavior.

Regarding FL measurement, Huston (2010) argues that it is necessary to identify financial welfare barriers and improve financial decisions, however, he recognizes that there is no standard instrument by which to measure FL. Therefore, previous studies have used different indicators; some are limited to estimating the level of financial knowledge of individuals, while others try to contemplate some proxies of attitudes and / or financial behavior.

Lusardi and Mitchell (2007) created an FL index based on three questions about compound interest, calculation of percentages and arithmetic calculation and only 18% of respondents correctly answered the question about compound interest. Subsequently, these same authors (Lusardi and Mitchell, 2011) published an index with three questions on interest, inflation and diversification, serving as a reference for subsequent studies by numerous authors. The number of books present at home has also been used as a measure to gauge the socio-economic origins of the students in the PISA report tests carried out by the OECD. In their study based on the PISA Financial report of 2015, Arellano et al. (2018) have followed this model for the work done on gender differences in FL in Spain.

Among the authors who have developed a measure of FL including the three dimensions proposed by the OECD (2011, 2013, 2015, 2017) are Klapper et al. (2013), Agarwalla et al., (2015), Kalmi, (2018), Potrich et al. (2015, 2018) and Baglioni et al. (2018). This

methodology is initially proposed by Atkinson and Messy (2012)[3] who, in their pilot study in 14 OECD countries (not including Spain), find that the level of financial knowledge is low, while there are possibilities of improvement for financial behavior and attitudes vary widely.

In their study based on a survey of financial competencies in Italy similar to that proposed by the OECD (2011, 2013), Baglioni et al. (2018), propose two indexes of FL. FL1 is created from three sub-index. The first is a sub-index of financial knowledge built on the basis of the number of correct answers given by individuals to financial questions. The second sub-index considers the financial attitude based on the propensity to save and the third refers to financial behavior. FL2 adds two sub-indexes, one for financial planning and another for familiarity with financial instruments, the latter constructed from the knowledge and use of a set of financial products. Finally, it is worth noting the work of West and Worthington (2018), which proposes an FL assessment based on a family financial survey conducted in Australia (HILDA), which does not include information regarding the financial knowledge of individuals, rather the saving habits of Australian households, their investment horizon, their attitude towards risk and their financial capacity to cope with unforeseen events.

Klapper et al (2015) carry out an international study based on the S&P Global FinLit survey, which basically measures the level of financial knowledge. These authors find that this level ranges between 52% in the EU and 63% in the USA. Within the EU, northern European countries are above 65%. Notwithstanding, the results vary according to the age segment of the sample.

2.2.2. Explanatory factors of FL. Arguments and hypotheses

As indicated above, the different theories that have been used by researchers in personal finance have considered the socio-economic and demographic characteristics of individuals and have related these factors from arguments from different disciplines; economics, sociology and psychology. Notably, Klapper et al. (2013) argue that FL is

[3] It should be noted that both authors are linked to the OECD. Specifically, Adele Atkinson is the director of education and strategy of the OECD and Flore-Anne Messy is the secretary and administrator of the education division of the OECD.

critical among certain specific groups such as women, seniors and pensioners, individuals with low levels of education and low incomes. Therefore, at present work, gender, level of education, income and age are considered determining factors of FL, to which marital status has been added. On the other hand, some studies have found evidence that the relationship between gender and FL is conditioned by other factors such as level of education, age, income or marital status.

2.2.2.1. Gender and financial literacy

Among the different theoretical approaches that analyze FL, the social roles theory (Eagly, 1987), as well as the theory of socialization (Harris, 1995), are the ones that provide the main arguments to explain the differences in FL according to gender. Role theory holds that the behaviors of men and women are influenced by the expectations associated with the roles imposed by society. The theory of socialization maintains that the differences in socialization between genders, linked largely to occupation, cause these differences to be transferred to households.

The role of women in society has evolved in the course of the greater incorporation of women into the labor market, which gives greater autonomy in the adoption of economic decisions. In developed countries, legislation takes into account equality policies. However, certain patterns of behavior that give rise to differences between men and women with regard to personal finances still persist. These differences are partly explained by the attitude toward risk, self-confidence or the greater role of men in the workplace (Driva et al., 2016). Other social and cultural factors play an important role in explaining the difference between genders.

The relationship between gender and FL has been analyzed in numerous studies, most of which agree that there are important differences. Several studies agree that the fact of being woman increases the probability of having low FL levels (van Rooij et al., 2011; Lusardi and Mitchell, 2011; Klapper et al., 2013; Potrich et al., 2015; Baglioni et al. al.; 2018; West and Worthington, 2018; Arellano et al., 2018).

It should be noted that the studies by van Rooij et al. (2011) and Lusardi and Mitchell (2011) are based on questions about financial knowledge, the work of Klapper et al. (2013), Potrich et al. (2015) and Baglioni et al. (2018) follow the methodology proposed by the OECD in 2011 and 2013, while the study by West and Worthington (2018), is

based on several sub-indexes among which financial knowledge is not included. Finally, the work of Arellano et al. (2018) is based on the questions asked in the 2015 Pisa Report.

Lusardi and Mitchell (2011) found that in the United States, women are not only more likely to respond erroneously to FL questions, but they are also more likely to indicate that they do not know the answers compared to men. This result is similar in different countries, which can make the female population an ideal target for financial education programs (Lusardi et al., 2010). Therefore, national strategies that attempt to reduce gender inequalities should focus on critical areas such as FL (Potrich et al., 2018).

These results have been documented in several countries such as USA (eg, Lusardi and Mitchell, 2008), Sweden (Almenberg and Säve- Söderbergh, 2011), Italy (Baglioni et al., 2018), Japan (Sekita, 2011), France (Arrondel et al., 2013), Switzerland (Brown and Graf, 2013) or India (Filipiak and Walle, 2015). In the case of Spain, Arellano et al. (2018) conclude in their study based on the PISA-2012 (relating to young people of about 15 years' old who have completed compulsory education), that although there are FL differences according to gender, these are reduced if non-cognitive abilities are considered (self-confidence, motivation and perseverance). On the other hand, Topa et al. (2018) have found significant differences in retirement planning among nurses older than 55, with there being less planning in the case of women. However, in their descriptive analysis of financial competences of adults in Spain, Bover et al. (2018) conclude that regarding the subindex of financial knowledge there is a gap of 11 percentage points between sexes, with women having a lower level of FL. On the contrary, in the case of Russia (Klapper and Panos, 2011), Thailand (Grohmann et al., 2016), no differences were found in FL regarding gender.

Finally, in the work carried out by Atkinson and Messy (2012), women had lower levels of knowledge and financial behavior than men, and in most of the 14 OECD economies analyzed, women were more likely to have a higher level of financial attitude than men.

According to the arguments presented, as well as the previous empirical evidence, the hypothesis that relates gender to FL is presented.

H1. Women present a lower FL than men.

2.2.2.2. Level of studies, gender and financial literacy

According to socio-cognitive theory (Bandura, 1989), the behavior of individuals is due to an interaction between personal factors (knowledge, expectations, attitudes and beliefs), environmental factors (resources, physical conditions, consequences of actions) and behavioral factors (individual actions, choices and verbal statements), so predictably, those with a higher educational level, accustomed to working with computers and interacting with other individuals of higher educational level, will be more likely to show a higher level of FL.

Financial knowledge is one of the main components on which FL relies. For this reason, some authors propose the introduction of financial education in the curricula of educational centres as a possibility of improving the overall level of FL. This possible solution would attempt to guarantee universal basic financial education so that even individuals with a lower educational level can make better financial decisions (Lusardi and Mitchell, 2014).

The concept of literacy requires the ability to read and understand information about products and other documents related to financial transactions in order to make decisions with sufficient information. In the same way, it requires practical knowledge to understand the impact of variables such as commissions, interest rate, inflation, and investment or credit risk. Accordingly, in his study on FL in Australia, Anz (2011: 11) finds that individuals who have completed post-secondary education have a higher score on all the components of FL. In the same way, Baglioni et al. (2018) and West and Worthington (2018) state that individuals with a university degree are more likely to have a high FL level. These authors argue that individuals with higher educational levels have a higher salary and the ability to accumulate more wealth, which gives them greater opportunity to acquire and practise their FL skills.

Previous empirical evidence indicates that individuals with low educational level tend to have lower FL levels in different countries, according to Lusardi and Mitchell, (2007, USA, 2011, international), Calvet et al. (2007, Sweden), van Rooij et al. (2011, Holland), Klapper et al. (2013, Russia), Baglioni et al. (2018, Italy), and West and Worthington (2018, Australia). However, according to Lusardi and Mitchell (2011), even at the highest educational levels, FL tends to be low. Of the aforementioned works, only Klapper et al. (2013, Russia), Baglioni et al. (2018) and West and Worthington (2018) deal with further

aspects beyond financial knowledge. There is consensus on the existence of a positive relationship between educational level and the level of FL. Finally, Atkinson and Messy (2012) find that individuals with higher education are more likely to have a high FL level in the three sub-indexes that make up the OECD methodology.

Based on the arguments and aforementioned evidence, the second hypothesis is presented in the following terms:

H2. Educational level is positively related to FL.

An initial explanation of the lower FL level among women may be that women tend to have lower incomes than men (Arellano et al., 2018). Some studies suggest that the difference in FL level between genders is due to specialization in households, since women tend to delegate financial decisions to their male partners. However, the delegation of these issues is more typical of different educational levels or different types of education than purely a question of gender (Fonseca et al., 2012; Baglioni et al., 2018). Fletschner and Mesbah (2011) found that financial knowledge of women improves in those cases in which women have a higher level of education. In this way, in developed countries, there has been a growing increase in the proportion of women with higher education, which should allow gender differences to narrow.

H3. Women with higher education have higher FL than women with lower levels of study.

2.2.2.3. Age, gender and financial literacy

The relationship between age and FL is part of the savings life cycle hypothesis, which assumes that a person consumes a percentage of their income throughout their life cycle and that they are born without inheritance and die without leaving a legacy (Ando and Modigliani, 1963). This assumes that middle-aged individuals will be more likely to make more investments than younger or older individuals. According to Finke et al. (2016), although several studies show a decline in cognitive abilities with age, which can affect confidence in financial decision making, it has been observed that this confidence increases with age. Lusardi and Mitchell (2014) find that older individuals educate themselves with a high level of FL, even though they score very low in the surveys conducted. This may explain why the biggest financial scandals have been perpetrated against older individuals.

Numerous authors have found that young people have a low level of FL (West and Worthington, 2018; Baglioni et al., 2018), although this level grows with age to a certain point at which it begins to decrease. In this way, the relationship between age and FL shows the inverted form of "U", that is, it starts at low levels that gradually increase up to a certain age coinciding with retirement, from which point the FL level decreases (van Rooij et al., 2011; Lusardi and Mitchell, 2011; West and Worthington, 2018; Baglioni et al., 2018). Equally, Agarwal et al. (2009) conclude that financial errors follow a U form, minimizing the chances of erring around the age of 53 years. Atkinson and Messy (2012) find that middle-aged individuals show a higher FL level in most of the countries analyzed, while older and younger individuals are more likely to have lower FL levels. Similarly, West and Worthington (2018) obtain information showing a lower level of FL in the individuals of lower and middle age, an average level of FL for retired individuals and a high level for individuals near the age of retirement. Finally, Baglioni et al. (2018) find a positive relationship between age and financial knowledge, as well as between age and the propensity to save, at least until retirement.

As has been stated, both the theoretical arguments and the empirical evidence point to the existence of certain patterns based on age and financial literacy. However, some studies find a relationship in the form of an inverted U while others obtain a different pattern of relationship according to age groups. Therefore, the hypothesis is presented in dual form.

H4a. Age and FL maintain a non-linear relationship.

H4b. The relationship between age and FL is different by age groups.

On the other hand, the gender difference in FL is broad and persists throughout the life cycle (Lusardi and Mitchell, 2014). Lusardi et al. (2010) find great differences in FL level between women and men, in their study referring to young people in the USA. In the same way, Arellano et al. (2018) find differences in FL among young people in Spain. Finally, in the report on the Survey of Financial Competences of adults, Bover et al. (2018) conclude that, despite the existence of a gap in terms of financial knowledge between genders, this difference narrows between young people and individuals who cohabit with other adults but who are not their partner. It is noteworthy that women have different savings needs, since they tend to live longer than men (Arellano et al., 2018). Therefore, in the fifth hypothesis a moderating effect of age in the relationship between age and FL is predicted.

H5. Age moderates the relationship between gender and financial literacy.

2.2.2.4. Income, gender and financial literacy

The relationship between income level and FL can be analyzed using the socio-cognitive theory (Bandura, 1989), which proposes that behavioral changes are affected by environmental influences, among other factors. This model holds that the individual must trust in their abilities to perform that behavior and must perceive an incentive to do so (for example, the positive relationship between FL and the level of income). Therefore, according to this model, those households occupied by individuals that have grown up in a high income environment will be more likely to remain financially literate and at high income levels.

The limited availability of FL teaching for people with low income levels represents a barrier to obtaining a high FL level. Some authors consider it necessary to popularize these programs for people with low level of studies, allowing them to obtain a higher level. These programs can have a significant return since FL is an important determinant of economic well-being (Jacob et al., 2000; Servon and Kaestner, 2008).

There are numerous previous studies that demonstrate the relationship between low income and the increase in the propensity to maintain a low FL level (Lusardi and Mitchell, 2007, Servon and Kaestner, 2008; Dvorak and Hanley, 2010; Klapper, 2013, Lusardi and Mitchell, 2014; Lusardi and Tufano, 2015; Baglioni et al., 2018; West and Worthington, 2018). Atkinson and Messy (2012) found a positive relationship between income level and FL level. In the studies by Kappler (2013) and Baglioni et al. (2018) this positive relationship is maintained in all sub-indexes.

Some studies have tried to relate the level of income with certain investment behaviors or financing of individuals. Thus, participation in the stock market increases along with income and wealth levels (van Rooij et al., 2011). According to these authors, the participation in this market is a sign of a higher level of FL, without forgetting that a low income hinders the application of financial knowledge, given the impossibility of entering financial markets such as the purchase of shares or other investment products. Regarding financing, it has been found that families with a low level of income tend to maintain a higher level of debt in relation to their income, which is why they are more likely to make late payments and therefore pay more for their debts (Hogarth and Anguelov, 2004).

Finally, Potrich et al. (2018) found a positive relationship with the level of both personal and household incomes.

Based on the arguments presented and the empirical evidence found, the sixth and seventh hypotheses are stated in the following terms:

> *H6. Individuals who belong to households with higher levels of income have a higher FL.*
>
> *H7. Woman who belong to households with higher levels of income have a higher FL than woman in households with lower income.*

2.2.2.5. Marital status, gender and financial literacy

Marital status is one of the family characteristics that is parametrized by a series of subjective norms and that can influence the behavior of individuals. In the case of heterosexual marriages and given that men have riskier tendencies in terms of investments, the presence of women can produce a neutralizing effect on men, as occurs to a greater extent in financial decision making when the woman's salary is higher over the total household wage (Euwals et al., 2004). This behavior can be framed within the theory of reasoned action formulated by Ajzen and Fishbein (1980), which is based on the fact that individuals maintain certain investment attitudes based on subjective norms and perceptions of behavior control. Marital status can also be framed within the socio-cognitive theory of learning (Redding et al., 2000), in which individuals gain knowledge and develop their behavior through interaction with their environment. In this way, it has been proven that the investment behavior of women and men can be significantly influenced by their partner.

In addition, marriage can contribute to longer-term financial planning (Baglioni et al., 2018). Changes in the family situation, such as a divorce, can cause situations of financial stress as expenses increase due to the division of the family nucleus. Baglioni et al. (2018) find a higher level of FL in married individuals or unmarried couples versus singles, regardless of gender. On the contrary, in their study referring to the USA, Fonseca et al. (2012), do not find differences in FL between married (or de facto couples), and unmarried. Following the preceding arguments, a positive relationship between being married or living as a couple and FL is proposed as the eighth hypothesis.

H8. Married couples and cohabiting couples have a higher FL level compared to those of a different relationship status.

On the other hand, Hsu (2016) finds that married women tend to increase their FL in advanced ages, once they are closer to an eventual widowhood. In addition, the longer life expectancy among women makes them prone to spend more time as widows, a state in which they must make their own financial decisions. Fonseca et al. (2012) argue that married women have a higher level of FL than that of married men, and of unmarried women. For Baglioni et al. (2018), marriage or cohabitation causes women to have a lower level of financial planning compared to men who have the same marital status. Finally, in their study on FL in Brazil, Potrich et al. (2018) find that among single women there is a lower proportion of high FL levels (42%) than among married women (52.2%). These authors conclude that single women with lower levels of education and lower incomes have a greater tendency to present low FL levels. These authors suggest that the greatest effort to improve the FL level should be made among single women.

H9. Married or cohabiting women have a higher FL than women with other marital status.

Table 2.1 summarizes the hypotheses, indicating the prediction.

Table 2.1. Synthesis of the hypotheses

Nº	Statement	Prediction
H1	Women present a lower FL than men.	Negative
H2	Educational level is positively related to FL.	Positive
H3	Women with higher education have higher FL than women with lower levels of education.	Positive
H4a	Age and FL maintain an non-linear relationship.	Non-linear
H4b	The relationship between age and FL is different by age groups.	Differences
H5	Age moderates the relationship between gender and FL.	Differences
H6	Individuals who belong to households with higher levels of income have a higher FL.	Positive
H7	Woman who belong to households with higher levels of income have a higher FL than woman in households with lower income.	Positive
H8	Married couples or cohabiting couples, have a higher FL level compared to those of a different relationship status.	Positive
H9	Married or cohabiting women have a higher FL than women with other marital status.	Positive

Source: own elaboration

2.3. METHODOLOGY

2.3.1. Sample and information source

The source of information used in this study has been the 2016 Financial Competencies Survey, the only one available to date about Spain (hereinafter, ECF-2016). This is a survey carried out by the Bank of Spain and the National Securities Market Commission, within the framework of the Financial Education Program. The National Institute of Statistics (INE) has collaborated to select the population under study, which has provided a large sample of randomly selected individuals, representative of the entire Spanish territory and of each of its autonomous communities. The ECF-2016 is part of an international project coordinated by the International Financial Education Network, which, under the auspices of the OECD, measures the knowledge, attitudes and financial behavior of the population of a wide range of countries in 2015 and 2016 (Bover et al., 2018). This survey has been prepared following the methodology proposed by the OECD (2011, 2013), in order to allow its comparison with other countries. A detailed explanation of this survey, as well as a descriptive analysis of its results, can be found in Bover et al. (2018). It was conducted for the first time between the last quarter of 2016 and the second quarter of 2017 with the objective of measuring the financial competences of the adult population in Spain, specifically individuals aged between 16 and 79 years.

The survey measures the knowledge and understanding of financial concepts of the Spanish population, as well as the possession, acquisition and use of different savings, debt and insurance vehicles. Specifically, the survey includes numerous modules among which are demographic variables, questions on financial aspects such as inflation, simple and compound interest, use of financial facilities such as financing and investment, planning and financial decision making, as well as employment and level of income.

The ECF-2016 contains responses from 8,554 individuals between 18 and 79 years old, although, for the elaboration of the index, the individuals that answer all the necessary questions have been selected to elaborate the necessary variables for the study, the final sample being composed of 8,261 individuals, and a similar number of men and women. Finally, the distribution of the sample in autonomous communities is presented in Table 2.2. Andalusia, Madrid, Catalonia and Valencia represent almost 40% of the sample,

according to the population of these communities. The lowest percentages correspond to the Balearic Islands, Cantabria, Navarra, the Canary Islands and La Rioja.

Table 2.2. Distribution of the sample by Autonomous Communities

	Autonomous Community	Nº	%
1	Andalusia	898	10.87
2	Aragón	440	5.33
3	Asturias	386	4.67
4	Balearic Islands	273	3.30
5	Canary Islands	296	3.58
6	Cantabria	281	3.40
7	Castilla-León	542	6.56
8	Castilla-La Mancha	458	5.54
9	Catalonia	828	10.02
10	Valencia	654	7.92
11	Extremadura	476	5.76
12	Galicia	556	6.73
13	Madrid	763	9.24
14	Murcia	374	4.53
15	Navarra	584	3.44
16	Basque Country	447	5.41
17	La Rioja	305	3.69
	Total	**8.261**	**100**

Source: own elaboration

2.3.2. Dependent variables: financial literacy and components

Previous empirical studies on FL can be classified into two groups. On the one hand, there are those based exclusively on a series of responses on basic financial concepts (e.g., Lusardi and Mitchell, 2007, Guiso and Jappelli, 2008; van Rooij et al., 2011), so that the results obtained should be considered only within the financial knowledge component. On the other hand, there are the studies that have been carried out using broader surveys on financial competences, such as the one proposed by the OECD (2011, 2013). To this group belong the works of Atkinson and Messy (2012), Kapler et al. (2013), Agarwalla et al. (2015), Potrich et al. (2018), Baglioni et al. (2018), which distinguish between the different FL components.

In accordance with the aforementioned definition of the concept, FL not only considers the level of financial knowledge, but also includes the behavior of individuals in relation to personal or family finances, as well as the attitude of individuals about the financial decisions. So, in this work four dependent variables are used of the econometric models

to contrast the hypotheses: financial literacy index and their three components: financial knowledge, financial behaviour and financial attitude.

In order to measure the level of FL in Spain, an index has been used, based on the definition proposed by the OECD (2011, 2013) according to which the FL contains three pillars: financial knowledge, financial behavior and financial attitude. To obtain each point, the OECD's 2010-2011 questionnaire was used, framed within the "International Network of Financial Education" program, which was created in 2008 with the objective of measuring and improving the level of financial competences and to which up to date has been applied to around 110 countries. For the preparation of this index and its three sub-indexes, the OECD methodology published in 2017 has been followed, which in turn follows the proposal by Atkinson and Messy (2012) in its pilot study to measure the FL level in 14 OECD economies.

Financial knowledge sub-index (Fin_Know). This sub-index can take values between 0 and 5. The variables that integrate it are all dichotomous and are interpreted in a direct sense, that is, 1 indicates higher FL and 0 lower FL. The sub-index is created by adding a point for each item, so a higher value of the sub-index represents a higher FL. To obtain each point, individuals had to answer correctly to 5 questions whose response derives from their understanding of certain financial concepts: inflation, simple and compound interest, the relationship between the profitability-risk binomial and the diversification of investment products. The index proposed by the OECD consisted of 7 questions, although observing some redundancy in two of them, it has been decided to eliminate them, so that the proposed index adopts values from 0 to 5.

Sub-index of financial behavior (Fin_Behavior). This sub-index can take values between 0 and 9. The variables that compose it are dichotomous (except one); the sub-index is constructed by addition and interpreted in a direct sense. To obtain each point, individuals had to answer affirmatively a range of questions including whether they are responsible for managing money in the home, making a budget, saving, if before buying something they weigh up whether they can keep it (pre-purchase decision making), timely payment of bills, awareness of personal finances, setting long-term financial goals, debt to cope with current expenses and if they are informed before buying a financial product. Therefore, this sub-index can be interpreted as family financial management. A higher

value of the sub-index indicates better management and vice versa. In this way, it is understood that better management is an indicator of a greater FL.

Financial attitude sub-index (Attitude). The attitude sub-index is based on the answer to 3 questions regarding savings. Specifically, respondents are asked if they agree or disagree with the following statements: 1) I tend to live for today and let tomorrow take care of itself; 2) I find it more satisfying to spend money than to save it in the long term and 3) The money is there to be spent. The answers are presented on a Likert scale, being (1) totally in agreement and (5) totally disagreeing. Therefore, a higher score indicates higher FL. Following the methodology of the OECD (2017), the attitude sub-index is calculated as the sum of the scores given to the questions divided by three, that is, the simple arithmetic mean. Therefore, the sub-index can adopt values from 1 to 5, and is interpreted directly, with 5 being the result that shows the highest FL.

Financial Literacy Index. Based on the sub-indexes of financial knowledge, financial behavior and attitude towards savings, following the methodology proposed by the OECD (2017), an FL index is proposed, adding for each individual the scores obtained in each of the three sub-indices. In this way, the FL index can range between 1 and 19, with 1 being the value that corresponds to the lowest FL and 19 to the maximum FL.

Details of the composition of the index are provided in Appendix 2.1, 2.2 and 2.3. Table A2.1 of Appendix 2.1 synthesizes the construction of the index, while Appendix 2.2 reproduces the guide for the creation of the FL index used by the OECD in the 2017 report. Also, because the questionnaire used in the ECF-2016 is not available on the date of completion of this work, Appendix 2.3 reproduces the questions of the questionnaire OECD / INFE published in March 2015, which in turn is an update of the questionnaire used in the report of 2013.

2.3.3. Explanatory variables and estimation method

According to the hypotheses, gender, education level, age, income level and marital status were considered as explanatory variables. Likewise, the interaction variables between gender and the rest of the explanatory variables are included. As control variables have been considered employment (either self-employed or employed by another), the size of the municipality and the autonomous community. The latter has proved important in the

study by Bover et al. (2018), in which a descriptive analysis of the results obtained in the ECF-2016 is carried out.

• *Gender*. The gender is collected through the variable ***Woman*** which adopts the value 1 if the respondent is woman and 0 if man.

• *Education level.* The level of studies has been collected through a dichotomous variable that adopts the value 1 if the individual has completed university studies (***Higher_studies***), be it a bachelor's degree or a master's degree.

• *Age.* The age of the reference person has been introduced in the models in two alternative ways, as a continuous variable in the form of a logarithm, and by intervals or age groups. For this, following Bover et al. (2018), 4 dichotomous variables have been created, which adopt the value 1 if the age of the individual is in the following ranges: ***Age_18-34*** (used as a reference group in the models), ***Age_35-54; Age_55-64*** and ***Age_65-79***.

• *Family income (**Income**).* For reasons of confidentiality, the family income level is a discrete variable tabulated in values from 1 to 3, taking at value 1 those households with incomes below € 14,500, at value 2 households with incomes between € 14,500 and € 45,000 and at value 3 households with incomes above € 45,000.

• *Civil status.* Marital status is collected through the variable ***Married/Couple***, which takes the value 1 if the reference person is married or has a domestic partner and 0 for any other civil status (separated, divorced, widowed, etc.).

• *Employment.* The dichotomous variable ***Employment*** adopts the value 1 if the individual is working either as self- employed or as an employee.

The following were considered as control variables:

• *Municipality* is a dichotomous variable (***Municipality***) that adopts the value 1 if the individual resides in a municipality with more than 15,000 inhabitants and zero if the municipality has a population smaller than said figure.

• *Autonomous Community **(CCAA).*** 17 dichotomous variables have been introduced, one for each autonomous community[4].

[4] The list of autonomous communities is presented in Table 2.2.

Estimation method. The testing of the hypothesis regarding the incidence of economic and socio-demographic factors requires considering that the dependent variable (FL index) adopts discrete values, although as it has been observed in the descriptive analysis, they are superior to zero[5], so they have estimated the models by linear regression. As robustness, following previous studies on financial literacy (e.g., Baglioni et al., 2018), the models have been estimated through an ordered probit analysis, which allows consideration of different discrete values of the dependent variable. All estimates have been made with the STATA 14 econometric package.

2.4. FINANCIAL LITERACY IN SPAIN. DESCRIPTIVE ANALISYS

2.4.1. Descriptive analysis of dependent variables

First, the distribution of the sample according to socio-demographic and economic characteristics is presented in Table 2.3.

Table 2.3. Distribution of the sample according to socio-demographic and economic characteristics

	Nº	**%**
Woman	4.127	50,04
Higher education	1.851	22,41
Age between 18-34	1.805	21,85
Age between 35-54	3.502	42,39
Age between 55-64	1.437	17,39
Age between 64-79	1.381	16,72
Incomes 1: <14500 euros	3.488	42.22
Incomes 2: entre 14500-45.000 euros	3.771	45,65
Incomes 3: > 45.000 euros	1.002	12,13
Married/Couple	5.475	66,28
Employed	4.387	53,10
Municipality >15.000 inhabitants	5.501	66,59

Source: own elaboration

As can be seen, the sample is characterized by a gender balance. Only 22% of the sample are educated to university level; almost 90% of the sample have an income of less than 45,000 euros; more than 60% of the sample are aged between 18 and 54; 66% of

[5] Except for a small number of observations in the sub-indexes of knowledge and financial behavior.

individuals in the survey live as a couple (or cohabit) and in municipalities of more than 15,000 inhabitants and 53% of respondents are in employment.

In Table 2.4. the distribution of the sample is collected for each of the indicators. As indicated, the FL index is obtained by adding the score of the three sub-index, so it initially adopts values between 1 and 19, although the minimum value of the sample is 2.

Table 2.4. Distribution of the FL index and its components

	FL index			Financial knowledge		Financial behavior		Financial attitude	
Values	**Nº**	**%**	**% acum**	**%**	**% acum**	**%**	**% acum**	**%**	**% acum**
0	0	0,00	0	3,01	3,01	0,08	0,08	0,00	0
1	0	0,00	0	14,96	17,97	0,61	0,69	2,40	2,40
2	1	0,01	0,01	26,66	44,63	2,12	2,81	12,95	15,35
3	4	0,05	0,06	26,63	71,26	6,60	9,41	31,95	47,30
4	21	0,25	0,31	19,13	90,39	15,58	24,99	41,22	88,51
5	45	0,54	0,85	9,61	100	24,17	49,16	11,49	100
6	112	1,36	2,21	-		25,72	74,88	-	-
7	236	2,86	5,07	-		17,32	92,2	-	-
8	445	5,39	10,46	-		7,42	99,62	-	-
9	714	8,64	19,1	-		0,38	100	-	-
10	985	11,92	31,02	-		-		-	-
11	1.232	14,91	45,93	-		-		-	-
12	1.321	15,99	61,92	-		-		-	-
13	1.188	14,38	76,3	-		-		-	-
14	946	11,45	87,75	-		-		-	-
15	601	7,28	95,03	-		-		-	-
16	313	3,79	98,82	-		-		-	-
17	79	0,96	99,78	-		-		-	-
18	15	0,18	99,96	-		-		-	-
19	3	0,04	100	-		-		-	-
Average		11,65		2,72		5,46		3,46	
Total	8.261	100		-		-		-	-

Source: own elaboration

From Table 2.4, it can be deduced that 45% of the individuals score below the average located around 11.65 points; 64% have a level of FL between 11 and 15 points and only 5% score above 15. Therefore, the results indicate that the number of individuals who respond adequately at least to half of the issues raised in the ECF -2016 is higher than 68% so, in general, it can be said that the level of FL in Spain is acceptable and is around the average of the OECD countries, especially in relation to the level of financial knowledge.

Analyzing the components of the FL index, in Table 2.4 it is observed that 3% of the respondents do not correctly answer any of the questions about financial knowledge, and about 15% of the individuals only correctly guess one of the questions. Adding the percentage of individuals who correctly answer only 2 of the 5 questions, it follows that 45% of individuals have a low level of financial knowledge. Finally, less than 10% of the respondents are able to respond correctly to the five issues related to inflation, interest rate, risk-return and diversification. Therefore, around 55% of respondents have a level of 3 or higher. These results coincide with those obtained by Bover et al. (2018) in their analysis of financial knowledge based on the ECF-2016, according to which the average percentage of respondents who correctly answered the three questions on inflation, compound interest and diversification is 51%, while in the group of the OECD it is 58%[6].

The sub-index of financial behavior ranges from 0 to 9 and is based on questions related to the concern for family finances, in terms of making a budget, paying bills on time and setting long-term financial goals, among others. Table 2.4 shows that about 25% of the sample are below 5 points. Around 50% of individuals respond adequately to 6 or 7 of the questions related to financial behavior and only 8% reach the upper levels (8 and 9) of this sub-index. Therefore, it can be affirmed that 75% of the respondents answered adequately to 5 or more of the 9 questions. It can therefore be interpreted that a majority of the respondents present an adequate level of financial behavior, that is to say that they carry out good management of their personal or family finances.

With respect to attitude towards saving, in Table 2.4 it is observed that only 15% of the sample does not reach the value 3 and more than half score at levels 4 and 5. Therefore, this is the component of the FL that presents the highest values.

The correlations between the different sub-index and the FL index are presented in Table 2.5. As can be seen, there is a positive and significant correlation between the three sub-indexes with the FL index, although there are significant differences in the coefficient. Thus, the sub-index of financial behavior shows the highest correlation with the index (0.76), followed by the sub-index of financial knowledge with (0.61), while the correlation of the sub-index of attitude to risk is 0.56. The scant correlation observed among the different sub-index, together with the different results obtained from the

[6] A detailed international comparison can be seen in Bover et al. (2018: 60).

descriptive analysis, suggests an analysis of the explanatory factors of FL, distinguishing the three components of the FL index.

Table 2.5. Descriptive statistics and matrix of correlations, sub-index and FL index

	FL Index	Financial knowledge sub-index	Financial behavior sub-index	Financial attitude sub-index
FL Index	1			
Financial kowledge sub-index	0.6138***	1		
Financial behavior sub-index	0.7650***	0.1178***	1	
Financial attitude sub-index	0.5686***	0.0545***	0.2605***	1

***, **, * significant at 1%, 5% and 10%, respectively

Source: own elaboration

From the descriptive analysis carried out, it is concluded that the Spanish hold an acceptable level of financial knowledge, an adequate capacity to manage their personal finances, and a good attitude towards saving. This is despite the fact that 31% of the individuals surveyed do not exceed the score of 10. It should be noted that, in most of the previous studies, the international comparison is made based on FL indicators based exclusively on financial knowledge. In this sense, the results obtained in the financial knowledge sub-index are consistent with those found in previous studies. For example, the study conducted by Klapper et al. (2015) in which only aspects of basic financial knowledge are measured, grants an FL level to Spain of 49%, and 52% to the European average.

With respect to the results obtained by Atkinson and Messy (2012) on the measurement of FL in 14 OECD economies, among which Spain is not, there was room for a significant improvement in financial knowledge for a huge proportion of the population, since in no country analyzed more than 70% of the population correctly answered 6 or more of the 8 questions asked. In terms of financial behavior, the results were similar. Only in one of the countries more than 70% of the respondents correctly answered 6 or more questions out of 9. However, these authors found great differences between countries. Hence, in this work the aim is to deepen the awareness of financial literacy in Spain, not only in an aggregate way, but distinguishing between financial knowledge, financial behavior or management of personal/family finances and attitude to saving. The existence of differences between these components can contribute to explain the differences between

countries, while allowing to implement adequate measures to improve the FL of individuals.

2.4.2. Relationship between FL and explanatory variables. Descriptive analysis

In order to analyze the possible differences in FL according to the explanatory variables considered in the study, Table 2.6 presents the mean values (% in the dichotomous variables) of gender (woman), level of studies, income, age and marital status (married or partner), for the values of the proposed index.

Table 2.6. Average values (% in dummies) of the explanatory variables for different levels of the FL index in Spain

	2-10	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
Woman	52,13	52,68	50,57	50,33	47,25	44,59	41,53	41,77	26,67	33,33
Higher studies	17,67	21,27	22,86	23,91	25,58	30,95	28,75	31,65	33,33	66,66
Age (years)	47,44	46,69	46,78	47,84	46,88	47,22	47,44	51,09	44,87	38,67
Incomes (log)	1,54	1,53	1,65	1,60	1,67	1,72	1,69	1,80	1,8	2
Married/Couple	60,32	67,20	67,22	68,94	67,55	72,38	76,68	83,54	73,33	100,00
Observ.	**2563**	**1232**	**1321**	**1188**	**946**	**601**	**313**	**79**	**15**	**3**

Source: own elaboration

For brevity, it has chosen to group the percentages corresponding to the values 2 to 10 of the index, which have little representation individually considered. As can be seen, the percentage of women is higher in the lower levels of the index, decreasing as the FL index increases, going from 50% at level 13 to 26% at level 18. With respect to higher education, the percentage increases as the FL level increases, with the sole exception of level 16. In general, the income also shows a positive association with the FL index. The average age is similar in all levels of the index, around 47 years, although a slight increase is observed up to level 17, after which it decreases to 38 years in the upper level. Finally, the fact of being married (or living as a couple), with the exception of levels 14 and 18, represents an increasing relationship with the FL index.

In an analogous way, the mean values of the different explanatory variables for each of the three sub-indices are presented in Table 2.7.

Table 2.7. Average values (% in dummies) of the explanatory variables for different levels of FL sub-indexes in Spain

	0	1	2	3	4	5	6	7	8	9
Panel A. Financial Knowledge Sub-index.										
Woman	56,22	62,22	54,81	49,64	38,48	40,05				
Higher studies	80,32	13,75	19,71	21,95	28,23	37,53				
Age (years)	49,02	47,87	47,31	46,86	46,67	47,58				
Incomes	1,27	1,45	1,56	1,59	1,71	1,88				
Married/Couple	59,44	64,40	63,40	67,73	69,75	68,39				
Obs.	249	1236	2202	2200	1580	794				
Panel B. Financial Behavior Sub-index										
Woman	42,86	40	43,43	46,79	52,06	50,48	49,74	52,27	45,51	58,06
Higher studies	28,57	14	18,86	21,28	20,12	23,54	22,02	25,09	21,04	25,81
Age (years)	56,86	43,84	45,77	47,41	47,44	46,36	47,58	47,65	47,78	48,10
Incomes	1,857	1,5	1,54	1,63	1,60	1,60	1,59	1,62	1,59	1,71
Married/Couple	57,14	44	53,14	60,55	65,19	66,60	67,2	66,74	73,25	80,65
Obs.	7	50	175	545	1287	1997	2125	1431	613	31
Panel C. Financial Attitude Sub-index										
Woman		39,39	42,15	48,31	52,83	55,95				
Higher studies		17,68	24,02	22,55	22,06	22,44				
Age (years)		47,76	47,01	47,26	47,26	47,15				
Incomes		1,61	1,63	1,61	1,60	1,55				
Married/Couple		53,54	58,88	63,74	69,10	74,18				
Obs.		198	1070	2639	3405	949				

Source: own elaboration

As can be observed, with respect to the financial knowledge sub-index, women have a greater presence in the lowest levels, while in the case of income, the opposite occurs, that is, the higher the level of income, the higher the score in the sub-index of financial knowledge. The ratio of the sub-index to the variables of higher education and the fact of being married is also positive, while the average age is similar in all levels of the sub-index.

The sub-index of financial behavior shows a positive association with higher education, income and cohabitation, while the distribution of age and gender do not show a definite trend. Finally, regarding the attitude sub-index towards savings, there is an increasing percentage of women at the highest levels, as well as those that cohabit. However, the

distribution of individuals with higher education, as well as age and income is very similar among different levels of the index.

The descriptive statistics of the explanatory variables are presented in Table 2.8.

Table 2.8. Descriptive statistics of the variables

	Average	D.T.	Minimum	Máximum
Woman	0,50	-	0	1
Higher studies	0,22	-	0	1
Age (log years)	3,79	0,37	2,83	4,38
Incomes	1,60	0,83	0	3
Married/Couple	0,66	-	0	1
Employment	0,53	-	0	1
Municipality	0,66	-	0	1

Source: own elaboration

Finally, in order to detect the existence of multicollinearity, the VIF (variance inflation factor) and the correlations between the variables have been calculated (see Table A2.2, appendix 2.4). As can be seen, the estimated VIFs are lower than 5, with an average of 1.07 (1.32 when including the autonomous communities). Likewise, there are few correlations between the variables, with the logical exception of the sub-index with the FL index. Both analyses confirm the absence of multicollinearity between the variables used in the models.

2.5. EXPLANATORY FACTORS OF FL IN SPAIN. SPECIAL REFERENCE TO GENDER

In order to contrast the hypotheses, following Baglioni et al. (2018), the models have been estimated considering the FL index as a dependent variable, as well as the different sub-indexes that make up the aforementioned index. This allows to analyze not only the incidence of explanatory factors at the FL level, but also to observe possible differences in the components that determine FL in Spain. In addition, it should be taken into account that many of the previous studies referring to FL only consider some of the aspects of it, especially financial knowledge, since they are based on surveys that ask about financial terms such as type of interest, inflation, etc.

2.5.1. Determinants of financial literacy in Spain

The results of the econometric estimation carried out in order to contrast the hypotheses regarding the variables without interaction are presented in Table 2.9. In model 1, the dependent variable is the FL index, while in models 2 to 4, each of the three sub-indices have been considered as a dependent variable. In these models age has been introduced in quadratic form, in order to analyze the possible non-linear relationship suggested in hypothesis H4a.

Table 2.9. Determinants of FL in Spain (I)
Estimation method: Linear regression

	Model 1	**Model 2**	**Model 3**	**Model 4**
D.V.: Index / Sub-index	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	-0,2004*** (0,0532)	-0,3851*** (0,0271)	0,0213 (0,3250)	0,1634*** (0,0204)
Higher Studies	0.4374*** (0.0680)	0.3531*** (0.3464)	0.0769* (0.0415)	0.0074 (0.0261)
Age (log)	0.1328 (1.5249)	0.9874 (0.7771)	-0.6996 (0.9313)	-1.1335* (0.5857)
Age^2 (log)	0,1326 (0,2080)	-0,1296 (0,1060)	0,1088 (0,1270)	0,1536 (0,0799)
Incomes	0.1326*** (0.0344)	0.1653*** (0.0175)	-0.0099 (0.0210)	-0.0229* (0.0132)
Married/couple	0.5372*** (0.0563)	0.1316*** (0.0287)	0.2045*** (0.0344)	0.2011*** (0.0216)
Employment	0,2077*** (0,0652)	0,1030*** (0.0332)	0,0715* (0,0398)	0,0332 (0,0251)
Municipality	0.1146* (0.0594)	0.1522*** (0.0303)	0,0469 (0.0363)	-0.0844*** (0.0228)
Autonomous Community	Yes	Yes	Yes	Yes
Constant	11.9571*** (2,7549)	0.2658 (1,4040)	6,2960*** (1,6825)	5.3953*** (1,0582)
Observations	8.261	8.261	8.261	8.261
Pseudo R^2	0.0327	0.0774	0.0107	0.0262

***, **,* significant at 1%, 5% and 10%, respectively

Source: own elaboration

Since in models 1 to 4 the age variable is not quadratic, it has been re-estimated the models considering the age in groups: between 35 and 54, between 55 and 64 years and over 65 years, the lower age of the reference group is 18-34 years old. The results collected in

Table 2.10 reveal that the age group of 55-64 years is positive and significant in all models, so it has been decided to maintain this model in all analyses.

Table 2.10. Determinants of FL in Spain (II)
Total sample Age in sections. Estimation method: Linear regression

	Model 5	**Model 6**	**Model 7**	**Model 8**
D.V.: Index / Sub-index	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	-0,2029*** (0,0532)	-0,3863*** (0,0271)	0,0208 (0,0325)	0,1625*** (0,0204)
Higher Studies	0,4441*** (0,0696)	0,3576*** (0,0345)	0,0787* (0,0414)	0,0078 (0,0260)
Age 18-34 years	Reference	Reference	Reference	Reference
Age 35-54 years	0,0553 (0,0696)	0,1152*** (0,0355)	0,0083 (0,0425)	-0,0682** (0,0267)
Age 55-64 years	0,3455*** (0,0841)	0,1474*** (0,0429)	0,1336*** (0,0514)	0,0645** (0,0323)
Age 65-79 years	0,0319 (0,0905)	-0,0128 (0,0461)	0,0700 (0,0553)	-0,0253 (0,0348)
Incomes	0,1311*** (0,0343)	0,1635*** (0,0175)	-0,0102 (0,0210)	-0,0222 (0,0132)
Married/Couple	0,5328*** (0,0563)	0,1306*** (0,0287)	0,2030*** (0,0344)	0,1993*** (0,0216)
Employment	0,1656*** 0,0633	0,0754** 0,0322	0,0640* (0,0387)	0,0262 (0,0243)
Municipality	0,1167** (0,0593)	0,1525*** (0,0302)	0,0480 (0,0363)	-0,0838*** (0,0228)
Autonomous Community	Yes	Yes	Yes	Yes
Constant	10,6120*** (0,1249)	2,0733 (0,0636)	5,1871*** (0,0763)	3,3516*** (0,0480)
Observations	8.261	8.261	8.261	8.261
Pseudo R^2	0,0347	0,0794	0,0111	0,0283

***, **,* significant at 1%, 5% and 10%, respectively

Source: own elaboration

As can be observed, the variable woman presents a negative and significant relationship in relation to the FL index and the financial knowledge sub-index, while losing its significance by relating to the financial behavior sub-index. It is noteworthy that, on the contrary, the variable woman is positive and significant in the model that explains the sub-index of financial attitude or attitude towards saving. This can be interpreted in

relation to the more conservative role and the greater concern for finances relatives on the part of women, as role theory predicts.

The variable of higher studies is positive, which indicates, as is foreseeable, that individuals with university studies have a higher level of FL than the rest. The only exception is the loss of significance in model 8, relative to the financial attitude sub-index. Age is positive and significant in the 55-64 age group in all models. In addition, it should be noted that the age group 35 to 54 years old is also significant in two of the models. However, it is positive in the sub-index of financial knowledge and negative in that of attitude. This can be interpreted in the sense that in relation to the globally considered level of FL, as in financial behavior, individuals aged between 55 and 64 years old improve their FL with respect to those of lower or higher ages. On one hand, financial knowledge seems to improve with age, at least until age 64 or retirement age. On the other hand, regarding the attitude towards saving, individuals between 35 and 54 years have a lower tendency to save than those of lower or higher age, at least until retirement age. These results are in line with previous studies and confirm the life cycle theory of savings.

Incomes variable present a positive and significant relationship with the FL index and with the financial knowledge sub-index. Therefore, it can be affirmed that individuals with the highest level of income have a higher FL level and greater financial knowledge. Marital status also contributes to explain FL, specifically, being married (or cohabiting), has a positive and significant relationship in all models.

Regarding the control variables, employment is positive and significant in all models, except for attitude. Living in a municipality with more than 15,000 inhabitants is favorable in the financial knowledge sub-index, as well as in the FL index, while it is negative for the attitude towards saving, and does not significantly influence the financial behavior sub-index. Finally, some differences are observed regarding autonomous communities[7]. In summary, it can be said that individuals with higher FL are characterized as being men, married or living with their partner, with a high level of income and higher education residing in areas of population of more than 15,000 inhabitants.

[7] The results obtained for the autonomous communities for these models is non reported. Only are presented in Table A2.5 of the appendix 2.5, only those relating to the models in which the variables of interaction of gender are introduced (models 9 to 12, table 2.11).

The table 2.11. collected the results of the models that include the variables through which contrast of the hypotheses is made, regarding the moderating effect of other socio-demographic variables in the relationship between gender and FL. As in Table 2.10, the models are estimated considering the FL index (model 9) as the dependent variable, as well as the three sub-indexes (models 10 to 12).

Regarding the results related to the variables without interaction (upper part of Table 2.11), it should be noted that the woman variable loses its statistical significance in the FL model, but maintains the sign negative and significant (model 10), and the positive sign in the sub-index of financial attitude. That is, women have a lower level of financial knowledge than men, but a better attitude towards saving. The rest of the variables present similar results in terms of sign and significance than in the models without interaction (Table 2.10), except in the sub-index of financial behavior, in which the completion of university studies and the age group of 35 to 54 years lose their statistical significance.

The results related to the interaction variables (lower part of Table 2.11), reveal that the combination of women and higher education is positive and significant in the FL index and in the financial behavior sub-index. This indicates that, in the case of women with higher education, the negative effect of being a woman in relation to FL is reduced, although it does not significantly affect financial knowledge or attitude towards saving. Only the 35-54 group age makes the relationship with women and the financial knowledge sub-index positive, although with a weak level of significance. In terms of marital status, interaction with women makes the relationship with all models negative and significant, although in the financial behavior model it is not significant, which indicates that being married or living in a couple enhances the negative effect of being a woman. The interaction with employment shows a negative relationship with the FL index and the financial behavior sub-index. However, the rest of the age brackets and the income of women variable do not seem to moderate the negative relationship between women and FL.

With respect to the autonomous communities (see results in Table A2.3, Appendix 2.5), considering as a reference the autonomous community of Andalusia, some differences are observed in the different models.

Table 2.11. Determinants of FL in Spain (III)

Estimation method. Linear regression

	Model 9	**Model 10**	**Model 11**	**Model 12**
D.V.: Index / Sub-index	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	0,0852 (0,1748)	-0,3120*** (0,0891)	0,1362 (0,1069)	0,2630*** (0,0671)
Higher Studies	0,3293*** (0,0954)	0,3288*** (0,0486)	-0,0057 (0,0583)	0,0062 (0,0367)
Age 18-34 years	Reference	Reference	Reference	Reference
Age 35-54 years	-0,0561 (0,0980)	0,0556 (0,0500)	-0,0326 (0,0599)	-0,0791** (0,0377)
Age 55-64 years	0,3294*** (0,1191)	0,1235** (0,0607)	0,1199* (0,0729)	0,0860* (0,0458)
Age 65-79 years	0,0462 (0,1266)	-0,0082 (0,0645)	0,0588 (0,0774)	-0,0043 (0,0486)
Incomes	0,1618*** (0,0489)	0,1773*** (0,0249)	0,0116 (0,0299)	-0,0271 (0,0188)
Married / Couple	0,6917*** (0,0795)	0,1821*** (0,4055)	0,2427*** (0,0486)	0,2669*** (0,0306)
Employment	0,2851*** 0,0899	0,1059** 0,0458	0,1340** (0,0550)	0,0452 (0,0345)
Municipality	0,1175** (0,0593)	0,1524*** (0,0302)	0,0494 (0,0363)	-0,0843*** (0,0228)
Woman-Higher studies	0,2235* (0,1354)	0,0544 (0,0690)	0,1682** (0,0828)	0,0009 (0,0520)
Woman-age 35-54	0,2214 (0,1392)	0,1195* (0,0710)	0,0803 (0,0851)	0,0217 (0,0535)
Woman-age 55-64	0,0337 (0,1681)	0,0484 (0,0857)	0,0293 (0,1028)	-0,0440 (0,0646)
Woman-age 65-79	-0.0212 (0,1812)	-0,0073 (0,0924)	0,0254 (0,1108)	-0,0394 (0,0696)
Woman-Incomes	-0,0600 (0,0686)	-0,0274 (0,0350)	-0,0431 (0,0419)	0,0104 (0,0263)
Woman-married	-0,3177*** (0,1124)	-0,1024* (0,0573)	-0,0795 (0,0687)	-0,1358*** (0,0432)
Woman-employment	-0,2407* (0,1267)	-0,0616 (0,0646)	-0,1409* (0,0774)	-0,0381 (0,0487)
Autonomous Community	Yes	Yes	Yes	Yes
Constant	10,4741 (0,1494)	2,0382 (0,0762)	5,1317 (0,0914)	3,3042 (0,0574)
Observations	8.261	8.261	8.261	8.261
Pseudo R^2	0,0366	0,0803	0,0123	0,0297

***, **,* significant at 1%, 5% and 10%, respectively

Source: own elaboration

Thus, the communities Aragón, Asturias, Cantabria, Castilla La Mancha, Valencia, Galicia, Madrid, Navarra and La Rioja present a significantly higher level of FL than Andalusia. In light of these results, a higher level can be observed in the north of Spain than in the south, with the exception of Madrid, Castilla La Mancha (both in the peninsular center) and Valencia (East). Regarding the sub-index of financial knowledge, all the communities present a higher level than Andalusia, except the Balearic Islands, the Canary Islands and Murcia. In relation to the sub-index of financial behavior, only Aragón, the Canary Islands and La Rioja present a better level and Catalonia a lower level than Andalusia, respectively. Finally, in the sub-index of attitude towards savings, only Castilla La Mancha (positive) and Catalonia (negative) are significant. Therefore, it can be affirmed that the main differences between communities are found in the level of financial knowledge, not so much in behavior and attitude towards saving.

2.5.2. Robustness analysis

As robustness, the models have been re-estimated considering on the one hand a different sub-sample, and on the other hand, a different estimation method.

Sensitivity of the results for single households

According to West and Worthington (2014), in order to isolate the effect of gender and to observe whether the negative effect of women in FL is maintained or not in these households, a sub-sample of households has been considered in which the person of reference is not married nor has a domestic partner (singles). The number of single households in the ECF amounts to 2,786. Of these, in 49.82% the reference person is a woman while in 50.18% of the households it is a man.

As has been discussed in the previous models, the more significant interaction with the woman variable is the married/couple variable. In addition, in a previous analysis, it was observed that the interaction variables are not significant in any of the models in the single household's sample. So, the estimation models for singles households not include the interaction between variables. Table 2.12 shows the results of the estimated models. As can be seen in model 13, the results are similar in sign and significance to those obtained in model 1 in terms of age, income, higher education and municipality, although the variables woman and employment lose their statistical significance. This indicates that the lower FL of women observed in the initial model does not occur in cases in which it

is a single woman who must make the financial decisions of the household. This offers support to the arguments that the role of women in society has evolved during a period of greater incorporation into the job market, which gives greater autonomy in the adoption of economic decisions, which logically is accentuated when the reference person has no partner.

Table 2.12. Determinants of FL in Spain. Robustness analysis (I)
Source: singles households. Estimation method: linear regression

	Model 13	**Model 14**	**Model 15**	**Model 16**
D.V.: Index / Sub-index	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	0,0072 (0,0942)	-0,3171*** (0,0472)	0,0711 (0,0577)	0,2532*** (0,0360)
Higher Studies	0,4267*** (0,1218)	0,3418*** (0,0610)	0,0669 (0,0745)	0,0180 (0,0465)
Age 18-34 years	Reference	Reference	Reference	Reference
Age 35-54 years	0,0719 (0,1236)	0,1183* (0,0618)	-0,0050 (0,0756)	-0,0414 (0,0471)
Age 55-64 years	0,3863** (0,1509)	0,1452* (0,0755)	0,1708* (0,0923)	0,0703 (0,0576)
Age 65-79 years	0,0661 (0,1584)	-0,0711 (0,0793)	0,1344 (0,0969)	0,0028 (0,0604)
Incomes	0,1608*** (0,0607)	0,1798*** (0,0304)	-0,0183 (0,0371)	-0,0007 (0,0232)
Employment	0,1493 (0,1134)	0,0508 (0,0567)	0,0429 (0,0694)	0,0556 (0,0433)
Municipality	0,2055* (0,1052)	0,1913*** (0,0527)	0,0739 (0,0644)	-0,0597 (0,0402)
Autonomous Community	Yes	Yes	Yes	Yes
Constant	10,5024*** (0,2054)	1,9856*** (0,1028)	5,2242*** (0,1257)	3,2926*** (0,0784)
Observations	2786	2786	2786	2786
Pseudo R^2	0,0267	0,0769	0,0162	0,0287

***, **,* significant at 1%, 5% and 10%, respectively

Source: own elaboration

Regarding the sub-indexes, the signs and significance for women with respect to models 6, 7 and 8 are maintained, with the variable of higher studies losing significance with respect to the sub-index of financial behavior. On the other hand, the age segments of 35-54 and 55-64 lose their significance with respect to the attitude sub-index in model 16.

The employment variable loses its significance in models 13, 14 and 15, compared with models 5, 6 and 7. The municipality variable loses its significance in model 16.

Sensitivity of the results to different estimation method

Finally, in order to assess whether the estimation method alters the results, following previous FL studies (e.g., Baglioni et al., 2018), the models have been estimated applying an ordered probit model. The results coincide with the comments and are presented in Table 2.13. According to the results presented in Table 2.13, the woman variable maintains the statistical significance in the models of knowledge and financial attitude. The results show a weak loss of significance of the woman variable with higher studies with respect to the index, maintaining the rest of the sign and significance variables than in the model 5. Regarding the rest of the sub-indexes, the rest of the variables are equal in terms of sign and significance

The variables of higher education and income are positive and significant in the FL model and in financial knowledge. Age is only significant (and positive) in the age 55-64 years old group in each model and in the age 35-54 group for the attitude sub-index. The fact of cohabitation is positive and significant in all models, while the municipality variable is positive and significant in models 17 and 18, whereas, in the attitude sub-index, it is significant and negative. Regarding the variables that reflect interaction with gender, the woman couple variable is the only one that maintains the negative sign and the statistical significance in all the models except for the sub-index of financial behavior. The woman employment interaction is significant and negative in models 17 and 19 and the interaction woman-higher studies is positive and significant only in the financial behavior model.

Table 2.13. Determinants of FL in Spain. Robustness analysis (II)

Estimation method: ordered probit

	Model 17	**Model 18**	**Model 19**	**Model 20**
D.V.: Index / Sub-index	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	0,0344	-0,2502***	0,0959	0,2902***
	(0,0730)	(0,0751)	(0,0740)	(0,0767)
Higher Studies	0,1399***	0,2792***	-0,0046	0,0093
	(0,0399)	(0,0412)	(0,0404)	(0,0418)
Age 18-34 years	Reference	Reference	Reference	Reference
Age 35-54 years	-0,0188	0,0503	-0,0214	-0,0893**
	(0,0410)	(0,0421)	(0,0415)	(0,0430)
Age 55-64 years	0,1421***	0,1120**	0,0887*	0,0981*
	(0,0498)	(0,0512)	(0,0505)	(0,0523)
Age 65-79 years	0,0255	-0,0056	0,0432	-0,0118
	(0,0529)	(0,0543)	(0,0536)	(0,0555)
Incomes	0,0692***	0,1523***	0,0088	-0,0317
	(0,0204)	(0,0211)	(0,0207)	(0,0215)
Married / Couple	0,2881***	0,1514***	0,1664***	0,3013***
	(0,0333)	(0,0342)	(0,0337)	(0,0349)
Employment	0,1182***	0,0901**	0,0927**	0,0467
	(0,0376)	(0,0386)	(0,0381)	(0,0394)
Municipality	0,0494**	0,1259***	0,0356	-0,0988***
	(0,0248)	(0,0255)	(0,0251)	(0,0261)
Woman-Higher studies	0,0913	0,0449	0,1105*	0,0008
	(0,0566)	(0,0583)	(0,0574)	(0,0595)
Woman-age 35-54	0,0898	0,0984*	0,0509	0,0227
	(0,0582)	(0,0597)	(0,0589)	(0,0611)
Woman-age 55-64	0,0072	0,0303	0,0084	-0,0461
	(0,0703)	(0,0722)	(0,0712)	(0,0740)
Woman-age 65-79	-0,0153	-0,0084	0,0089	-0,0360
	(0,0757)	(0,0777)	(0,0767)	(0,0796)
Woman-Incomes	-0,0266	-0,0252	-0,0310	0,0111
	(0,0287)	(0,0295)	(0,0291)	(0,0301)
Woman-married	-0,1297***	-0,0852*	-0,0517	-0,1499***
	(0,0470)	(0,0483)	(0,0476)	(0,0493)
Woman-employment	-0,1008*	-0,0515	-0,0950*	-0,0398
	(0,0529)	(0,0543)	(0,0537)	(0,0557)
Autonomous Community	Yes	Yes	Yes	Yes
Observations	8.261	8.261	8.261	8.261
Pseudo R^2	0,0081	0,0254	0,0034	0,0113

***, **,* significant at 1%, 5% and 10%, respectively

Source: own elaboration

2.6. DISCUSSION OF RESULTS AND CONCLUSIONS

Based on the FL concept proposed by the OECD (2011, 2013), which considers that FL is based on three pillars: financial knowledge, financial behavior and financial attitude, in this study an integrated FL index is elaborated by three sub-indexes corresponding to each of the aforementioned components. To this end, the ECF-2016 was drawn up, prepared by the Bank of Spain in collaboration with the CNMV, which contains information on the knowledge and financial behavior of individuals, their attitudes towards saving, as well as other socio-demographic characteristics of adult individuals in Spain. For the elaboration of the sub-indexes, the methodology published by the OECD in 2017 was followed, based on the proposal of Atkinson and Messy (2012) who carried out a similar study on 14 countries that had participated in the study, among which Spain is not found.

From the descriptive analysis carried out, it is concluded that the FL level in Spain is acceptable and is around the average of the OECD countries, especially regarding the level of financial knowledge. In addition, the Spanish have an adequate capacity to manage their personal finances, and a good attitude towards saving. It should be noted that, in most of the previous studies, the international comparison is made based on FL indicators exclusively regarding financial knowledge. In this way, the results obtained in the financial knowledge sub-index are consistent with those found in previous studies. These results are in line with those obtained by Atkinson and Messy (2012). This allow to affirm that the FL level in Spain is around the average of the OECD countries (Bover et al., 2018). However, they offer an overview of FL better than those found in other previous studies conducted internationally. Thus, for illustrative purposes, in their study conducted for a sample that includes Germany, Holland, Sweden, Italy, Japan, New Zealand, Russia and USA, Lusardi and Mitchell (2011) conclude that the level of FL is very low in the whole world, regardless of the level of development of the financial market. In the same way, Almenberg and Säve-Söderbergh (2011), find a low level of FL among adults in Sweden. Likewise, Boisclair et al. (2017) also obtain a low FL in Canada, especially in certain groups. However, all these studies interpret financial competences simply as financial knowledge, not considering financial behavior and financial attitude as the model proposed in this article following the methodology of the OECD (2011, 2013).

Regarding the explanatory factors of FL, nine hypotheses are proposed. First, the results related to gender indicate that women have a lower FL than men, although this effect is only significant in the financial knowledge sub-index, so that H1 can be accepted partially. Numerous authors confirm the existence of this gap, which translates into a lower propensity to plan for retirement in the case of women when delegating financial decisions to men (Baglioni et al., 2018). These results coincide with those obtained by Lusardi et al. (2010), Lusardi and Mitchell (2008, 2011), Almenberg and Säve-Söderbergh (2011), Sekita (2011), van Rooij et al. (2011), Arrondel et al. (2013), Brown and Graf (2013), Klapper et al. (2013), Filipiak and Walle (2015), Potrich et al. (2015, 2018), Driva et al. (2016), Baglioni et al. (2018), West and Worthington (2018), Topa et al. (2018) and Arellano et al. (2018). This can have important implications due to factors such as the longer life expectancy of women and the interruption of their professional career by maternity (Arellano et al., 2018). However, the relationship between the woman and the attitude sub-index towards saving is positive, showing a more conservative mood in terms of spending in the case of women and with the sub-index of financial behavior not being significant. The study published by Baglioni et al. (2018) shows a non-significant relationship between gender and the financial attitude sub-index.

Regarding educational level, the results related to the incidence of higher education in the FL offer support for hypothesis H2, according to which a higher educational level facilitates the understanding necessary for financial decision making. These results are in line with those obtained by Lusardi and Mitchell (2007, 2011, 2014), Calvet et al. (2007), Anz (2011), van Rooij et al. (2011), Klapper et al. (2013), Baglioni et al. (2018) and West and Worthington (2018). This relationship only remains in the financial knowledge sub-index, since it does not seem relevant in the behavior or financial attitude components. Therefore, the hypothesis regarding the FL index is accepted, although only partially in the sub-indexes.

The relationship between age and FL level is positive for the age bracket of 55- 64 years old. Although many previous studies argue that there is an inverted U-shaped relationship (Agarwal et al., 2009; van Rooij et al., 2011; Lusardi and Mitchell, 2011, 2014; Finke et al., 2016; West; and Worthington, 2018; Baglioni et al., 2018), in the models estimated by including the quadratic age the significance of the two variables is lost. However, the result obtained shows that the age group between 55 and 64 years old have a higher FL

than those of lower or higher age. These results are maintained in all the sub-indexes, which allows partial acceptance of hypothesis H4b according to which there is differences in FL by age groups.

Similarly, for the FL index, hypothesis H6 can be accepted, in which a positive relationship between income level and FL is predicted, because a low income hinders the application of financial knowledge. These results are in line with those obtained by Jacob et al., (2000); Servon and Kaestner (2008), Lusardi and Mitchell (2007, 2014), Dvorak and Hanley (2010), van Rooij et al. (2011), Klapper, (2013), Lusardi and Tufano (2015) and West and Worthington (2018). One possible explanation is that individuals with a higher level of income have a greater need for information to invest in more sophisticated financial products. In this regard, some authors such as van Rooij et al. (2011), establish a positive relationship between the level of income and the purchase of shares. However, this result is only maintained in the financial knowledge sub-index, which coincides with the results of Baglioni et al. (2018), so this hypothesis is accepted partially in the case of the sub-index.

The H8 hypothesis proposes a higher level of FL for married or cohabiting individuals, showing in fact a positive relationship between being married and the level of FL, so that H8 is accepted, in all indicators. One possible explanation for this result is the higher relative level of expenses of married individuals who have next of kin in their care, as well as a greater need for financial planning by the unmarried, in order to meet their future needs. These results coincide with those obtained by Baglioni et al. (2018) who find in Italy a positive relationship between being married or living as a couple with respect to the unmarried. In contrast, Fonseca et al. (2012) do not find differences according to marital status in their study on USA.

Regarding the moderating effect of the remaining variables in the relationship between gender and FL, a positive relationship has been revealed between being a woman and having higher education in relation to the FL index and the financial behavior sub-index, which can be interpreted in the sense that having higher education reduces the negative effect of being a woman. Therefore, hypothesis H3 is accepted regarding the FL index, although only partially for the sub-index. It is noteworthy how in the models in which the *woman* variable loses statistical significance (and, in addition, the sign is positive), it is fair when the interaction between women and higher education is significant and positive.

This reinforces the idea that women per se do not have a lower FL than men, but that it depends on the level of education. On the contrary, in the models in which the woman variable is negative and significant, the interaction with other variables is only affected (and negatively) when she is married or living with a partner, which may be due to women delegating financial decisions to their partner.

The hypothesis H5 is rejected since the results of the age effect in the woman-FL relationship are not significant for the FL index. In addition, women aged between 35 and 54 years are weakly significant, so H5 is rejected in all sub-indexes. Income does not moderate the relationship between women and FL, so hypothesis H7 is rejected. Finally, being married or cohabiting strengthens the negative effect of women in FL; therefore, hypothesis H9 is rejected because the existing relationship is contrary to prediction (obtained sign is opposite to prediction). Table 2.14 presents a synthesis of the results obtained in relation to each of the hypotheses.

Table 2.14. Summary of results

Nº	**Variables**	**Prediction**	**Results**				**Acceptance / Rejection**	
			FL	**Fin. Knowl.**	**Fin. Behav.**	**Fin. Attitude**	**FL**	**Sub-index**
H1	Woman	Negative	n.s.	Negative	n.s.	Positive	Rejected	Partial
H2	Higher studies	Positive	Positive	Positive	n.s.	n.s.	Accepted	Partial
H3	Woman-Hig. studies	Positive	Positive	n.s.	Positive	n.s.	Accepted	Partial
H4a	Age (years)	Non linear	n.s.	n.s.	n.s.	Negative	Rejected	Rejected
H4b	Age (groups)	Differences	Positive[a]	Positive[a]	Positive[a]	Positive[a] Negative[b]	Partial	Partial
H5	Woman-Age	Differences	n.s.	n.s.	Positive[c]	n.s.	Rejected	Rejected
H6	Incomes	Positive	Positive	Positive	n.s.	n.s.	Accepted	Partial
H7	Woman-Incomes	Positive	n.s.	n.s.	n.s.	n.s.	Rejected	Rejected
H8	Married	Positive	Positive	Positive	Positive	Positive	Accepted	Accepted
H9	Woman-Married	Positive	Negative	Negative	n.s.	Negative	Rejected	Rejected

Partial acceptance is indicated when the variable is significant in any of the sub-index or age brackets.
[a] Age is only significant and positive in the pre-retirement age group (55-64)
[b] Age is significant and negative in the age group of 35-54 years in the financial attitude only.
[c] Age is weakly significant and positive in the 35-54 age group only.
n.s.. not significant

Source: own elaboration

In addition to the conclusions regarding the individually considered hypotheses, two general conclusions can be drawn from the results obtained. Firstly, the relevance of considering the different components of FL, since as has been observed, the socio-demographic and economic variables are affected differently depending on the indicator used. This makes it advisable to specify the FL measurement used in the studies, since the conclusions are not comparable. Second, the results of the study question the existing consensus in the literature regarding the incidence of gender in FL. As mentioned, it is necessary to take into account the level of studies, as well as marital status since the consideration of these factors contributes to explain the aforementioned relationship.

Regarding the practical implications, it can be pointed out that institutions wishing to increase FL levels in Spain could focus on woman unmarried with low levels of education, who are under 55 years old or above 64 years old, as a group more likely to maintain a low FL level which have a greater prospect of improvement in FL. If financial institutions wish to address a segment of clients with a higher level of FL, they should focus on married or cohabiting men aged between 55 and 64 years old, with high incomes and higher education, since these individuals are more likely to understand more complex financial products and plan their finances in the long term.

REFERENCES

Agarwal, S., Driscoll, J. C., Gabaix, X. and Laibson, D. (2009). The age of reason: Financial decisions over the life cycle and implications for regulation. *Brookings Papers on Economic Activity*, *2009*(2), 51-117.

Agarwalla, S. K., Barua, S. K., Jacob, J. and Varma, J. R. (2015). Financial literacy among working young in urban India. *World Development*, *67*, 101-109.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.

Ajzen, I. y Fishbein, M. (1980). Theory of Reasoned Action. In: Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall

Almenberg, J. and Säve-Söderbergh, J. (2011). Financial literacy and retirement planning in Sweden. *Journal of Pension Economics and Finance*, *10*(4), 585-598.

Ando, A. and Modigliani, F. (1963). The "life cycle" hypothesis of saving: Aggregate implications and tests. *The American Economic Review*, *53*(1), 55-84.

Anz, I. (2011). Adult Financial Literacy in Australia Survey. The Social Research Centre, 1–153.

Arellano, A., Cámara, N. and Tuesta, D. (2018). Explaining the Gender Gap in Financial Literacy: The Role of Non-Cognitive Skills. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 495-518.

Arrondel, L., Debbich, M. and Savignac, F. (2013). Financial literacy and financial planning in France. *Numeracy*, *6*(2), 8.

Atkinson, A. and Messy, F. (2012). Measuring Financial Literacy: Results of the OECD/ International Network on Financial Education (INFE) Pilot Study", OECD Working Papers on Finance, Insurance and Private Pensions, 15, OECD Publishing. http://dx.doi.org/10.1787/5k9csfs90fr4-en.

Baglioni, A., Colombo, L. and Piccirilli, G. (2018). On the Anatomy of Financial Literacy in Italy. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 245-304.

Bandura, A. (1989). Human agency in social cognitive theory. *American psychologist*, *44*(9), 1175.

Bank of Spain (2018). Website of Bank of Spain. https://www.bde.es/bde/es/

Bank of Spain (2018). Survey of Financial Competences 2016-2017. Website of Bank of Spain. https://www.bde.es/bde/es/areas/estadis/Otras_estadistic/encuesta-de-comp/

Blasco, N. and Ferreruela, S. (2017). Behavioral finance: ¿Por qué los inversores se comportan como lo hacen y no como deberían? *Bolsas y Mercados Españoles*.

Boisclair, D., Lusardi, A. and Michaud, P. C. (2017). Financial literacy and retirement planning in Canada. *Journal of Pension Economics and Finance*, *16*(3), 277-296.

Bover, O., Crespo, L., Gento, C. and Moreno, I. (2018). The Spanish survey of household finances (EFF): Description and methods of the 2014 wave. Banco de España, Occasional Paper, 1804.

Bover, O.; Hospido, L. and Villanueva, E. (2018). Encuesta de Competencias Financieras 2016. Dirección General de Economía y Estadística del Banco de España.

Brown, M. and Graf, R. (2013). Financial literacy and retirement planning in Switzerland. *Numeracy*, *6*(2), 6.

Calvet, L.E.; Campbell, J. and Sodini, P. (2007). Down or Out: Assessing the Welfare Costs of Household Investment Mistakes, *Journal of Political Economy*, 115 (5), 707–747.

Driva, A., Lührmann, M. and Winter, J. (2016). Gender differences and stereotypes in financial literacy: Off to an early start. *Economics Letters*, *146*, 143-146.

Dvorak, T. and Hanley, H. (2010). Financial Literacy and the Design of Retirement Plans, *The Journal of Socio-Economics*, 39 (6), 645–652.

Eagly, A.H. (1987). Sex differences in social behavior: A social-rol interpretation. Hillsdale, New Jersey. Lawrence Earlbaum.

Euwals, R., Eymann, A. and Börsch-Supan, A. (2004). Who determines household savings for old age? Evidence from Dutch panel data. *Journal of Economic Psychology*, *25*(2), 195-211.

Finke, M. S., Howe, J. S. and Huston, S. J. (2016). Old age and the decline in financial literacy. *Management Science*, *63*(1), 213-230.

Filipiak, U. and Walle, Y. M. (2015). *The financial literacy gender gap: A question of nature or nurture?* (No. 176). Courant Research Centre: Poverty, Equity and Growth-Discussion Papers.

Fletschner, D. and Mesbah, D. (2011). Gender disparity in access to information: do spouses share what they know? *World Development*, *39*(8), 1422-1433.

Fonseca, R., Mullen, K. J., Zamarro, G. and Zissimopoulos, J. (2012). What explains the gender gap in financial literacy? The role of household decision making. *Journal of Consumer Affairs*, *46*(1), 90-106.

García-Aracil, A.; Neira, I. and Albert, C. (2016). Social and Cultural Capital Predictors of Adolescents' Financial Literacy: Family and School Influences. *Revista de Educación*, 374, 91-115). Ministerio de Educación y Ciencia.

Grohmann, A., Hübler, O., Kouwenberg, R. and Menkhoff, L. (2016). Financial literacy: Thai middle class women do not lag behind. DIW Berlin Discussion Paper No. 1615. Available at SSRN: https://ssrn.com/abstract=2867919 or http://dx.doi.org/10.2139/ssrn.2867919

Guiso, L. and Jappelli, T. (2008). Financial literacy and portfolio diversification (Working Paper no. 212). *Retrieved from Centre for Studies in Economics and Finance website: http://www. csef. it/WP/wp212. pdf*.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological Review*, *102*(3), 458.

Hira, T. K. (2009). Personal finance: Past, present and future. *Networks Financial Institute Policy Brief 2009-PB-10. Available at SSRN: https://ssrn.com/abstract=1522299 or http://dx.doi.org/10.2139/ssrn.1522299*

Hogarth, J. M. and C.E. Anguelov (2004). Are Families Who Use E-Banking Better Financial Managers? *Financial Counseling and Planning*, 15 (2), 61–78.

Hospido, L., Villanueva, E. and Zamarro, G. (2015). Finance for all: the impact of financial literacy training in compulsory secondary education in Spain. Banco de España,

Working Paper No. 1502. Available at SSRN: https://ssrn.com/abstract=2559642 o http://dx.doi.org/10.2139/ssrn.2559642.

Hsu, J. W. (2016). Aging and strategic learning: The impact of spousal incentives on financial literacy. *Journal of Human Resources,* 51(4), 1036-1067.

Huston, S. J. (2010). Measuring financial literacy. *Journal of Consumer Affairs*, *44*(2), 296-316.

Jacob, K., Hudson, S. and Bush, M. (2000). Tools for Survival: An Analysis of Financial Literacy Programs. *Chicago: Woodstock Institute*.

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263–292.

Kalmi, P. (2018). The Effects of Financial Education: Evidence from Finnish Lower Secondary Schools. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 353-386.

Klapper, L. and Panos, G. A. (2011). Financial literacy and retirement planning: the Russian case. *Journal of Pension Economics and Finance*, *10*(4), 599-618.

Klapper, L., Lusardi, A. and Panos, G. A. (2013). Financial literacy and its consequences: Evidence from Russia during the financial crisis. *Journal of Banking & Finance*, *37*(10), 3904-3923.

Klapper, L., Lusardi, A. and Van Oudheusden, P. (2015). Financial literacy around the world. *Standard & Poor's Ratings Services Global Financial Literacy Survey*. *http://gflec.org/wp-content/uploads/2015/11/Finlit_paper_16_F2_singles.pdf*.

Lusardi, A. and Mitchell, O. S. (2007). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, *54*(1), 205-224.

Lusardi, A. and Mitchell, O. S. (2008). Planning and financial literacy: How do women fare? *American Economic Review*, *98*(2), 413-17.

Lusardi, A., Mitchell, O. S. and Curto, V. (2010). Financial literacy among the young. *Journal of Consumer Affairs*, *44*(2), 358-380.

Lusardi, A. and Mitchell, O. S. (2011). Financial literacy around the world: an overview. *Journal of Pension Economics and Finance*, *10*(4), 497-508.

Lusardi, A. and Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, *52*(1), 5-44.

Lusardi, A. and Tufano, P. (2015). Debt literacy, financial experiences, and over indebtedness. *Journal of Pension Economics and Finance*, *14*(4), 332-368.

Mason, C. L. and Wilson, R. (2000). *Conceptualizing financial literacy*. © Loughborough University.

MiFID, I. I. (2014). Directive 2014/65/EC of the European Parliament and of the Council.

OECD INFE (2011). Measuring Financial Literature: Questionnaire and Guidance Notes for Conducting an Internationally Comparable Survey of Financial Literacy. Paris: OECD.

OECD/INFE (2013). Toolkit to Measure Financial Literacy and Financial Inclusion: Guidance, Core Questionnaire and Supplementary Questions.

OECD/INFE (2015). Toolkit for measuring financial literacy and financial inclusion.

OECD (2017), G20/OECD INFE report on adult financial literacy in G20 countries.

PISA 2012. Informe español, Ministerio de Educación y Formación Profesional. http://www.educacionyfp.gob.es/inee/evaluaciones-internacionales/pisa/pisa-2012.html

PISA 2015. Science Framework. *2015-3-14]*.

http://www.oecd.org/pisa/pisaproducts/Draft% 20PISA% 202015% 20Science% 20Framework% 20. pdf.

Potrich, A. C. G., Vieira, K. M., Coronel, D. A. and Bender Filho, R. (2015). Financial literacy in Southern Brazil: Modeling and invariance between genders. *Journal of Behavioral and Experimental Finance*, *6*, 1-12.

Potrich, A. C. G., Vieira, K. M. and Kirch, G. (2018). How well do women do when it comes to financial literacy? Proposition of an indicator and analysis of gender differences. *Journal of Behavioral and Experimental Finance*, *17*, 28-41.

Redding, C. A., Rossi, J. S., Rossi, S. R., Velicer, W. F. and Prochaska, J. O. (2000). Health behavior models. In *International Electronic Journal of Health Education*.

Remund, D. L. (2010). Financial literacy explicated: The case for a clearer definition in an increasingly complex economy. *Journal of Consumer Affairs*, *44*(2), 276-295.

Savoia, J.R.J., Saito, A.T. and Santana, F.A. (2007). Paradigmas da educação financeira no Brasil. *Revista de AdministraÇãO Pública*, 41 (06), 1121–1141.

Sekita, S. (2011). Financial literacy and retirement planning in Japan. *Journal of Pension Economics and Finance*, *10*(4), 637-656.

Servon, L. J. and Kaestner, R. (2008). Consumer financial literacy and the impact of online banking on the financial behavior of lower-income bank customers. *Journal of Consumer Affairs*, *42*(2), 271-305.

Topa, G., Segura, A. and Pérez, S. (2018). Gender differences in retirement planning: a longitudinal study among Spanish Registered. Nurses. *Journal of Nursing Management*, *26*(5), 587-596.

van Rooij, M. C., Lusardi, A. and Alessie, R. J. (2011). Financial literacy and retirement planning in the Netherlands. *Journal of Economic Psychology*, *32*(4), 593-608.

Velecela, P. A. C., Vallejo, J. I. G. and Jara, B. D. V. (2017). Finanzas personales: la influencia de la edad en la toma de decisiones financieras. *Killkana Social*, *1*(3), 81-88.

West, T. and Worthington, A. C. (2014). Personal attributes and financial risk-taking in Australia. *JASSA*, (1), 25.

West, T. and Worthington, A. C. (2018). Synthesizing an Index of Financial Literacy Using Not-For-Purpose Survey Data. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 331-352.

APPENDIX

APPENDIX 2.1. COMPOSITION OF THE FL INDEX

Table A2.1. Composition of the FL Index

Variable	FL Sub-index	ECF Question	
	Values	Code	Values
Financial knowledge subindex	**0-5**		
Inflation	0-1	QK3	3
Simple interest	0-1	QK5	102
Compound interest	0-1	QK6	1
Profitability-Risk	0-1	QK7_1	1
Diversification	0-1	QK7_3	1
Financial Behavior Subindex	**0-9**		
Responsible for financial decisions and budget	0-1	QF1 y QF2	QF1=1-2 & QF2= 1
Active saving	0-1	QF3	A,c,d,e,f,g
Consider purchase	0-1	QF10_1	1-2
Invoices paid on time	0-1	QF10_4	1-2
Monitor your financial affairs	0-1	QF10-6	1-2
Set a long-term financial goal	0-1	QF10-7	1-2
Choice of financial products (1)*	0-1	Qprod_D1	1 or 4
Choice of financial products (2)*	0-2	Qprod_D2	1 if= B,c,d,i,j,k,l,m,r 2 if= e,f,g,h
Need for a loan to make ends meet	0-1	QF12	1 if= a,b,c,d, -97,-98 y -99
Financial Attitude Subindex	**1-5**		
Live up to date	1-5	QF10_2	(1-5)/3
Enjoy more spending than saving	1-5	QF10_3	(1-5)/3
Money is to be spent	1-5	QF10_8	(1-5)/3
Financial Literacy Index (FL) = Add three su-index	1-19		

* In the subindex of financial behavior, within the questions referring to "choice of financial products (1) and (2) the value can be maximum 2 if it obtains in the question Qprod_D2 the score 2, otherwise, 1.

Source: own elaboration from OECD (2017) and ECF-2016

APPENDIX 2.2. GUIDE FOR THE CREATION OF THE LITERACY FINANCIAL INDEX

Source: OECD (2017), Reproduction of Appedix 2

The purpose of the guide is to provide information on how to create financial literacy scores that are comparable to the ones in this report.

The guide closely follows the approach used for the pilot study (Atkinson and Messy, 2012). Scores are replicated as closely as possible, with the exception of the creation of the Choosing Products score, which has been very slightly refined to better reflect the benefits of using independent information or advice.

1. Financial knowledge score

The knowledge score is computed as the number of correct responses to the financial knowledge questions, according to Table 25. It ranges between 0 and 7 (it is also possible to replicate the 8-point score created in 2012 for countries using QK2 by adding the additional response).

Table 25. Computing a financial knowledge score

Topic	Question number	Discussion	Value towards final score	
Time-value of money	QK3	This is multiple response and very context specific, and so the 2015 question includes an indicator of the rate of inflation	1 for correct responses [c, unless the country indicates otherwise; or d, if mentioned spontaneously]. 0 in all other cases.	Part A
Interest paid on a loan	QK4	This is open response and a correct answer indicates that the respondent understands the concept of interest on a loan	1 for correct response [0]. 0 in all other cases.	
Interest plus principal	QK5	This is open response and a correct answer is an indicator of applied numeracy	1 for correct response [102]. 0 in all other cases.	
Compound interest	QK6	QK6 is a multiple-response question; there are four options given. In order to take into account some of the potential for guessing the answer to this question, the score is based on a derived variable that filters out those respondents that could not calculate simple interest at QK5.	1 for a correct response to QK6 if and only if the response to "Calculation of interest plus principal" (QK5) was also correct. 0 in all other cases.	
Risk and return	QK7_1	This is a true/false question	1 for a correct response [1/True]. 0 in all other cases.	Part B
Definition of inflation	QK7_2	This is a true/false question	1 for a correct response [1/True]. 0 in all other cases.	
Diversification	QK7_3	This is a true/false question	1 for a correct response [1/True]. 0 in all other cases.	

Note: Question numbers refer to the 2015 Toolkit

2. Financial behavior score

The behavior score is computed as a count of the number of "financially savvy" behaviors according to Table 26. It ranges between 0 and 9 as in 2012. As people do not necessarily indicate all of these financial behaviors in a given period it may not be realistic to expect everyone to achieve a minimum target score.

Table 26. Computing a financial behaviour score

Behaviour	Question number	Discussion	Value towards final score
Responsible and has a household budget	QF1 and QF2	The score is based on a derived variable, created from the responses to two questions.	1 point if personally or jointly responsible for money management [QF1=1 or 2] AND household has a budget [QF2=1]. 0 in all other cases.
Active saving	QF3	This question identifies a range of different ways in which the respondent may save. A refusal is scored as 0.	1 point for any type of active saving (answers a, c, d, e, f, g), and relevant options added at the national level. 0 in all other cases. Letting money build up in a bank account is not considered to be *active saving* (answer b) and gives 0 points towards the score.
Considered purchase	QF10_1[35]	This is a scaled response ("Before I buy something I carefully consider whether I can afford it")	1 point for respondents who put themselves at 1 or 2 on the scale [agree]. 0 in all other cases.
Timely bill payment	QF10_4	This is a scaled response ("I pay my bills on time").	1 point for respondents who put themselves at 1 or 2 on the scale [agree]. 0 in all other cases.
Keeping watch of financial affairs	QF10_6	This is a scaled response ("I keep a close personal watch on my financial affairs").	1 point for respondents who put themselves at 1 or 2 on the scale [agree]. 0 in all other cases.
Long term financial goal setting	QF10_7	This is a scaled response ("I set long term financial goals and strive to achieve them").	1 point for respondents who put themselves at 1 or 2 on the scale [agree]. 0 in all other cases.

Table 26. Computing a financial behaviour score (Cont.)

Behaviour	Question number	Discussion	Value towards final score
Choosing products	Qprod2 and Qprod3	This score uses a derived variable drawing information from 2 questions. It is only possible for a respondent to score points on this measure if they have chosen a product: those with 0 score on this measure have either refused to answer, not chosen a product, or not made any attempt to make an informed decision. The list of products is tailored to national markets. The score seeks to make a general comparison of behaviour when choosing a financial product.	The variable "choosing products" is constructed by creating two intermediate variables, and then creating a derived variable. Country specific responses can also be coded. The two intermediate variables are the following: 1) **Qprod_D1**: "Tried to compare across providers" taking value of: ▪ 1 if variable Qprod2 is equal to 1 or 4 (I considered several or I looked around but there were no others), and ▪ 0 otherwise. Note that 0 includes no recent product choice/not applicable. 2) **Qprod_D2**: "Sought information or advice" taking values ▪ 1 if yes at Qprod3 b, c, d, i, j, k, l, m or r (information picked up in branch/ product specific information found on the internet/Information from sales staff of the firm providing the products / Advice of friends/relatives (not working in the financial services industry) / Advice of friends/relatives (who work in the financial services industry) / Employer's advice / Newspaper articles / Television or radio programmes / Other source [if relevant]) ▪ 2 if yes at Qprod3 e, f, g or h (Best-buy tables in financial pages of newspapers/magazines / Best-buy information found on the internet / Specialist magazines / Recommendation from independent financial adviser or broker) ▪ 0 otherwise. Note that 0 includes no recent product choice. The final variable – Qb7_new "Tried to shop around or use independent info or advice" has been slightly refined from earlier versions. It takes the following values: ▪ 2 if CProd_D2 =2. The value of 2 indicates "Used independent info or advice" ▪ 1 if CProd_D1 =1 *or* CProd_D2 =1. The value of 1 indicates "Some attempt to make informed decision" ▪ 0 Otherwise. The value 0 indicates "Not shopped around and no attempt to make informed decisions (including no recent product choice)". The change has been made to better reflect the benefit of using independent information and advice.

Behaviour	Question number	Discussion	Value towards final score
Borrowing to make ends meet	QF12	The score is based on a derived variable that seeks to identify respondents who are making ends meet without borrowing. It uses QF12 to identify those who have borrowed to make ends meet.	0 if the respondent used credit to make ends meet, that is if he/she responded Yes at any of the following – or other country specific responses indicating that he/she used credit to make ends meet: QF12_3_e = Borrow from family or friends QF12_3_f = Borrow from employer/salary advance QF12_3_g = Pawn something that you own QF12_3_h = Take a loan from your savings and loans clubs QF12_3_i = Take money out of a flexible mortgage account QF12_3_j = Apply for loan/withdrawal on pension fund QF12_4_k = Use authorised, arranged overdraft or line of credit QF12_4_l = Use credit card for a cash advance or to pay bills/buy food QF12_5_m = Take out a personal loan from a financial service provider (including bank, credit union or microfinance) QF12_5_n = Take out a payday loan QF12_5_o = Take out a loan from an informal provider/moneylender QF12_6_p = Use unauthorised overdraft QF12_6_q = Pay my bills late; miss payments 1 in all other cases, including refusals and respondents who did not have problems in making ends meet.

Note: Question numbers refer to the 2015 toolkit

2. Financial attitudes score

The attitudes score is computed as the sum of the values for the three statements and then divided by three[36]. The attitudes score, therefore, ranges from 1 to 5.

Table 27. Computing a financial attitudes score

Attitude	Question number
I tend to live for today and let tomorrow take care of itself	QF10_2
I find it more satisfying to spend money than to save it for the long term	QF10_3
Money is there to be spent	QF10_8

Note: Question numbers refer to the 2015 toolkit

3. Overall financial literacy score

The overall financial literacy score is obtained as the sum of the three previous scores (financial knowledge (7), financial behaviour (9) and financial attitudes (5) at the level of the respondent. It can take any value between 1 and 21 and can be normalised to 100 for reporting by multiplying by 100/21.

APPENDIX 2.3. QUESTIONS FROM THE ECF-2016 CONSIDERED IN THE ELABORATION OF THE FINANCIAL LITERACY INDEX

The questionnaire used in the ECF-2016 in Spain is not available on the date of completion of this study, so the document published by the OECD / INFE was used in March 2015, which in turn is a version updated methodology published in September 2013. The questions of the 2015 questionnaire used to create the financial literacy index are reproduced below.

UPDATED OECD/INFE CORE QUESTIONNAIRE

This survey instrument updates the OECD/INFE Core Questionnaire used in the 2010 measurement exercise, taking into account feedback received and recent developments.

The questions are intended to be read out loud by an interviewer. There is no requirement for the respondent to be able to read or write.

Some questions need editing before use to reflect country specificities. This is indicated in the 'notes to agency' provided above the questions concerned. Questions in grey are optional additions; authorities should decide if they are relevant within the national context.

Financial Knowledge Sub-index:

Five brothers are going to be given a gift of $1,000 in total to share between them.
QK3) Now imagine that the <brothers> have to wait for one year to get their share of the $1,000 and inflation stays at X percent. In one year's time will they be able to buy:

[Note to agency: Add in current inflation rate in your country and provide a note on the rate used and the date from which this was taken. Option D is considered to be correct if reported spontaneously but it is not to be read out loud.]

INTERVIEWER: READ OUT a-c	**Variable name: QK3** **Label: Brothers have to wait for one year with inflation at X percent**
a) More with their share of the money than they could today;	1
b) The same amount;	2
c) Or, less than they could buy today.	3
d) *It depends on the types of things that they want to buy*	4
e) *Don't know*	-97
f) *Refused*	-99
g) *Irrelevant answer*	-999

QK5) Suppose you put $100 into a <no fee, tax free> savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment is made?

[Note to agency: Change to local currency. Do not change percentage rate. If savings accounts incur fees in your country, please include a phrase to reflect the wording in <> and provide a note to this effect for international comparisons.]

INTERVIEWER: READ QUESTION AGAIN IF ASKED	**Variable name: QK5** **Label: Simple interest**
a) Record Response [Minimum value=0]	__
b) *Don't know*	-97
c) *Refused*	-99
d) *Irrelevant answer*	-999

QK6) and how much would be in the account at the end of five years [add if necessary: remembering there are no fees or tax deductions]? Would it be:

[Note to agency: Change to local currency. Note that this question is intended to indicate whether the respondent knows about compound interest, and so the amount in each of the options must be exactly equal to the total interest without compounding.]

INTERVIEWER: READ LIST a-d	**Variable name: QK6** **Label: Compound interest**
a) More than $110	1
b) Exactly $110	2
c) Less than $110	3
d) Or is it impossible to tell from the information given	4
e) Don't know	-97
f) Refused	-99
g) Irrelevant answer	-999

I would like to know whether you think the following statements are true or false:

[Note to agency: if the word 'risk' is difficult to translate, we recommend using question QK5a_alt instead of QK5a. For countries/regions where the stock market may not be widely understood QK5c_alt may be more appropriate than QK5c. Countries may wish to test both versions of these two questions.]

	Variable names: QK7_
INTERVIEWER: READ OUT EACH STATEMENT AND WAIT FOR RESPONSE	**Create a single variable for each statement. Record responses as: 1=True, 0=False, -97=Don't know, -99=Refused**
a) An investment with a high return is likely to be high risk	_1
A alt) If someone offers you the chance to make a lot of money it is likely that there is also a chance that you will lose a lot of money.	_1alt
b) High inflation means that the cost of living is increasing rapidly	_2
c) It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares.	_3
C alt) *It is less likely that you will lose all of your money if you save it in more than one place.*	

Financial Behavior Sub-index:

QF1) Who is responsible for making day-to-day decisions about money in your household?

	Variable name: QF1
INTERVIEWER: READ OUT a- c:	**Label: Decisions**
a) You make these decisions by yourself,	1
b) You make these decisions with someone else, or	2
c) Someone else makes these decisions	3
d) *Don't know*	-97
e) *Refused*	-99

QF2) and, does your household have a budget? A household budget is used to decide what share of your household income will be used for spending, saving or paying bills. Variable name: QF2

	Label:
Household budget	
a) Yes	1
b) No	0
c) *Don't know*	-97
d) *Refused*	-99

QF3) In the past 12 months have you been [personally] saving money in any of the following ways, whether or not you still have the money?

[Note to agency: Please do not include pension savings in question QF3. Please replace <informal savings club> with appropriate term or drop it. If necessary, remind the participant that this is entirely confidential, and that their data will be anonymised.]

Variable name: QF3_
Labels: Actively saving_

Rotate list

INTERVIEWER: READ OUT a- g. MARK ALL THAT APPLY.

	This is multi-coded. Create a single variable for each response. Record responses as: 1=Yes, 0=No, -99=Refused.
a) Saving cash at home or in your wallet	_1
b) Building up a balance of money in your bank account	_2
c) Paying money into a savings account	_3
d) Giving money to family to save on your behalf	_4
e) Saving in <an informal savings club>	_5
f) Buying financial investment products, other than pension funds [give examples such as bonds, investment trusts, stocks and shares]	_6
g) Or in some other way (including remittances, buying livestock, gold or property)	_7
h) *Has not been actively saving*	*_8*
i) *Don't know*	*_97*
j) *Refused*	*_99*

QF10) I am now going to read out some statements. I would like to know how much you agree or disagree that each of the statements applies to you, personally.

Please use a scale of 1 to 5, where:

- 1 tells me that you completely agree that the statement describes you, and
- 5 shows that you completely disagree

[Note to agency: record responses with values 1, 2, 3, 4, 5, or don't know=-97, not relevant=-98 (this option should preferably only be used for item i, relating to normal living expenses), refused=-99 as relevant]

INTERVIEWER: repeat the scale as many times as necessary. If respondent answers (dis)agree: check 'Would you say you completely (dis)agree'? If they say they don't know, check whether they feel they neither agree nor disagree (record as 3 on scale), or if they are really uncertain (in which case record their response as don't know). For statement k: If the respondent says 'I don't have any debt', record the response as 1 'agrees totally'.

Rotate list

INTERVIEWER: READ OUT EACH STATEMENT AND WAIT FOR RESPONSE.

	Variable name: QF10_ Label using the statement Create a single variable for each statement. Record responses as: 1, 2, 3, 4, 5, -97=Don't know, or -99=Refused.
a) Before I buy something I carefully consider whether I can afford it	_1
b) I tend to live for today and let tomorrow take care of itself	_2
c) I find it more satisfying to spend money than to save it for the long term	_3
d) I pay my bills on time	etc
e) I am prepared to risk some of my own money when saving or making an investment	
f) I keep a close personal watch on my financial affairs	
g) I set long term financial goals and strive to achieve them	

Qprod1_d) Which of these did you choose most recently? Variable name: Qprod1_d

INTERVIEWER: READ OUT PRODUCTS LISTED AT QPROD1 IF NECESSARY RECORD RESPONSE_____	**Label: Most recent product** Record response using same coding as in Qprod1_c
a) *Don't know*	-97
b) *Not applicable*	-98
c) *Refused*	-99

Qprod2) and which of the following statements best describes how you made your choice? Variable name: Qprod2;

INTERVIEWER: READ OUT a-d; RECORD ONLY THE ONE THAT BEST DESCRIBES… **around**	**Label: Shopping**
a) I considered several options from different companies before making my decision	1
b) I considered the various options from one company	2
c) I didn't consider any other options at all	3
d) I looked around but there were no other options to consider	4
e) *Don't know*	-97
f) *Not applicable*	-98
g) *Refused*	-99

QF12) What did you do to make ends meet the last time this happened?

[Note to agency: Please add in country specific options under each category. Category headings are for content guidance. This question is multi-coded. Create a single variable for each response, plus a variable for 'don't know' and one for 'refused'. For the purpose of measuring financial literacy, the number of codes can be reduced by simply using the category headings (such as existing resources). However, the more detailed information may be useful.] **Variable names: QF12_**

Labels: Making ends meet

INTERVIEWER: PROBE WITH: DID YOU DO ANYTHING ELSE? MARK ALL THAT APPLY. DO NOT READ OUT OPTIONS: ALTHOUGH EXAMPLES CAN BE GIVEN	This is multi-coded. Create a single variable for each response. Record responses as: 1=Yes, 0=No.
_1 Existing resources	
a) Draw money out of savings or transfer savings into current account	_1_a
b) Cut back on spending, spend less, do without	_1_b
c) Sell something that you own	
_2 Creating resources	
d) Work overtime, earn extra money	_2_d
_3 Access credit by using existing contacts or resources	
e) Borrow from family or friends	_3_e
f) Borrow from employer/salary advance	
g) Pawn something that you own	
h) Take a loan from your savings and loans clubs	
i) Take money out of a flexible mortgage account	
j) Apply for loan/withdrawal on pension fund	
_4 Borrow from existing credit line	
k) Use authorised, arranged overdraft or line of credit	_4_k
l) Use credit card for a cash advance or to pay bills/buy food	
_5 Access additional credit	
m) Take out a personal loan from a financial service provider (including bank, credit union or microfinance)	etc

n) Take out a payday loan	
o) Take out a loan from an informal provider/moneylender	
_6 Fall behind/ go beyond arranged amount	
p) Use unauthorised overdraft	
q) Pay my bills late; miss payments	
_7 Other responses	
r) Other	
s) *Don't know*	*_97*
t) *Not applicable (income covers living expenses)*	*_98*
u) *Refused*	*_99*

Financial Attitude towards Saving Sub-index:

QF10) I am now going to read out some statements. I would like to know how much you agree or disagree that each of the statements applies to you, personally.
Please use a scale of 1 to 5, where 1 tells me that you completely agree that the statement describes you, and 5 shows that you completely disagree.

[Note to agency: record responses with values 1, 2, 3, 4, 5, or don't know=-97, not relevant=-98 (this option should preferably only be used for item i, relating to normal living expenses), refused=-99 as relevant]

INTERVIEWER: repeat the scale as many times as necessary. If respondent answers (dis)agree: check 'Would you say you completely (dis)agree'? If they say they don't know, check whether they feel they neither agree nor disagree (record as 3 on scale), or if they are really uncertain (in which case record their response as don't know). For statement k: If the respondent says 'I don't have any debt', record the response as 1 'agrees totally'.
Variable name: QF10_

Rotate list INTERVIEWER: READ OUT EACH STATEMENT AND WAIT FOR RESPONSE.	**Label using the statement** Create a single variable for each statement. Record responses as: 1, 2, 3, 4, 5, -97=Don't know, or -99=Refused.
a) Before I buy something I carefully consider whether I can afford it	_1
b) I tend to live for today and let tomorrow take care of itself	_2
c) I find it more satisfying to spend money than to save it for the long term	_3
d) I pay my bills on time	etc
e) I am prepared to risk some of my own money when saving or making an investment	
f) I keep a close personal watch on my financial affairs	
g) I set long term financial goals and strive to achieve them	
h) Money is there to be spent	
i) My financial situation limits my ability to do the things that are important to me	
j) I tend to worry about paying my normal living expenses	
k) I have too much debt right now	
l) I am satisfied with my present financial situation	
The affirmations b, c and h are those used to create the sub-index of attitude towards saving. The answers to these statements using a Likert scale (takes values from 1 to 5) show the degree of agreement with these values, with 1 being totally in agreement and 5 totally disagreeing.	

APPENDIX 2.4. CORRELATION MATRIX AND VIF

Table A2.2. Matrix of correlations and VIF

		1	2	3	4	5	6	7	8	9	10	11
	VIF											
1.FL Index	-	1										
2.Fin. Know	-	0,6138***	1									
3.Fin. Behavior.	-	0,7650***	0,1178***	1								
4.Fin. Attitude	-	0,5686***	0,0545***	0,2605***	1							
5.Woman	1,00	-0,0404***	-0,1501***	0,0083	0,0861***	1						
6.Higher studies	1,13	0,0978***	0,1617***	0,0240**	-0,0030	-0,0060	1					
7.Age (log)	1,03	0,0079*	-0,0066	0,0207*	-0,0029	0,0059	-0,0372***	1				
8.Employment	1,12	0,0616***	0,0939***	0,0185*	0,0037	0,0168	0,2263***	-0,1788***	1			
9.Incomes	1,13	0,0754***	0,1529***	0,0042	-0,0180	-0,0102	0,2919***	-0,0507***	0,2285***	1		
10.Married	1,00	0,1041***	0,0499***	0,0643***	0,1026***	0,0032	0,0149	0,0007	0,0064	-0,0108	1	
11.Municipality	1,11	0,0169*	0,0520***	0,0118	-0,0454***	0,0139	0,0440***	0,0093	0,0060	0,0112	-0,0216**	1

*** significant at 1%, ** 5% and * 10%, respectively

Source: own elaboration

APPENDIX 2.5. RESULTS OF THE ESTIMATES CORRESPONDING TO THE AUTONOMOUS COMMUNITIES

Table A2.3. Determinants of FL in Spain

Results of the variables related to the Autonomous Communities models 9 to 12

Estimation Method: Linear regression

	Model 9	**Model 10**	**Model 11**	**Model 12**
D.V.: Index / Subindex	Financial Literacy	Financial Knowledge	Financial Behavior	Financial Attitude
Autonomous Communities	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Andalusia	Reference	Reference	Reference	Reference
Aragón	0,5977*** (0,1404)	0,3923*** (0,0716)	0,2060** (0,0859)	-0,0006 (0,0540)
Asturias	0,4496*** (0,1469)	0,3428*** (0,0749)	0,1143 (0,0898)	-0,0074 (0,0564)
Balearic Islands	0,1071 (0,1669)	0,1015 (0,0851)	-0,0538 (0,1021)	0,0594 (0,0641)
Canary Islands	0,1333 (0,1620)	-0,1186 (0,0826)	0,1926* (0,0990)	-0,0475 (0,0622)
Cantabria	0,5731*** (0,1653)	0,5005*** (0,0843)	0,0380 (0,1011)	0,0346 (0,0635)
Castilla-León	0,1512 (0,1316)	0,1791*** (0,0671)	-0,0051 (0,0805)	-0,0228 (0,0505)
Castilla-La-Mancha	0,3499** (0,1395)	0,1614** (0,0711)	0,0068 (0,0853)	0,1817*** (0,0536)
Catalonia	-0,0990 (0,1164)	0,1982*** (0,0593)	-0,1648** (0,0712)	-0,1325*** (0,0447)
Valencia	0,2087* (0,1242)	0,1201* (0,0633)	0,0605 (0,0759)	0,0281 (0,0477)
Extremadura	0,1685 (0,1376)	0,1715* (0,0702)	0,0314 (0,0841)	-0,0345 (0,0529)
Galicia	0,2290* (0,1304)	0,3172*** (0,0665)	0,0094 (0,0797)	-0,0976* (0,0501)
Madrid	0,4012*** (0,1194)	0,3116*** (0,0609)	0,0500 (0,0730)	0,0395 (0,0459)
Murcia	0,0678 (0,1490)	0,6499 (0,0760)	-0,0640 (0,0911)	0,0668 (0,0573)
Navarra	0,3567** (0,1658)	0,3432*** (0,0845)	0,0390 (0,1014)	-0,0255 (0,0637)
Basque Country	0,0893 (0,1397)	0,2119*** (0,0712)	-0,1128 (0,0854)	-0,0098 (0,0537)
La Rioja	0,5428*** (0,1494)	0,2485*** (0,0817)	0,2797*** (0,9800)	0,0146 (0,0616)

***, **, *significant at 1%, 5% y 10%, respectively

Source: own elaboration

CHAPTER 3.

TOLERANCE TO THE FINANCIAL RISK OF FAMILIES IN SPAIN. SPECIAL REFERENCE TO GENDER

3.1. INTRODUCTION

Studies on the tolerance of families to financial risk are framed within the field of personal finances or households, which have contributions from economics, psychology and sociology. With regard to risk tolerance, the decisions of individuals and families directly affect their wealth, since, in the long term, high profitability can only be obtained by assuming risky investments. Therefore, if households are not willing to take large risks, the profitability they can obtain will not be higher than the average (Palson, 1996).

Knowledge of family risk tolerance is very important, first of all, for the families themselves, since depending on their attitude they can limit their losses and their benefits as well. It is also important for the functioning of the financial system, since less risk-adverse customers hire more profitable products for the bank industry such as stocks, investment funds, pension funds or structured products. However, in January 2018 the Mifid II regulation came into force with the aim of improving transparency and customer protection of financial institutions. One of the changes that has occurred and is mandatory for financial institutions is the introduction of the yields obtained during the last 10 years from the different risk profiles of investors in the pre-contractual documentation, so that investors know the worst and best scenarios of the products for each risk profile. For this reason, identifying the determinants that characterize clients less adverse to risk can benefit financial institutions by allowing them to focus on this segment of customers (Machauer and Morgner, 2001).

On the other hand, the role of women in society has evolved while there has been a greater incorporation into the labor market, which results in greater autonomy in the adoption of economic decisions. Despite the policies of equality carried out in developed countries, certain patterns of behavior persist that give rise to differences between men and women with regard to personal finances. These differences are partly explained by the attitude toward risk, self-confidence or the greater role of men in the workplace (Driva et al., 2016). Other social and cultural factors play an important role in explaining the difference between genders. Hence the importance of analyzing the incidence of gender in the risk tolerance of families, as well as the possible moderating role of other socio-demographic and economic characteristics of households in the relationship between gender and risk tolerance.

The tolerance towards risk has been analyzed in the literature from different theoretical approaches. From the economic perspective, the theory of expected utility (Von Neumann and Morgenstern, 1944) and the theory of portfolio selection (Markowitz, 1952) are emphasized. These theories suggest that the attitude towards risk is determined by the preferences of investors regarding the relationship between expected results and the level of risk they are willing to assume. Other theories that have contributed to explain the relationship between the socio-demographic aspects and the attitude towards saving are the life cycle theory of saving (Ando and Modigliani, 1963), the theory of socialization (Harris, 1995) and the theory of roles (Eagly, 1987). Role theory holds that the behaviors of women and men are influenced by the expectations associated with the roles imposed by society, while the theory of socialization holds that the differences in socialization between genders, linked in large part to work, are transferred to households. Both theories acquire great relevance in this study, since special reference is made to gender.

Numerous authors have studied empirically the tolerance to risk in different contexts such as Australia (Austen et al., 2010), Italy (Díaz-Serrano, 2005), Holland (Noussair et al., 2013), United States (Fairlie and Holleran, 2012), Nepal (Carvalho et al., 2016) and England (Balli et al., 2016), among others. The results observed in Spain are ambiguous since the study by Zinkhan and Karande (1991) concludes that the Spanish population has been more prone to risk than that of the United States, while for Pérez-Perea (2016), more than 79% of the population Spanish population is declared adverse to risk. As far as our knowledge is concerned, these two contributions are the only ones that deal with the attitude towards risk in terms of financial investments in Spain.

On the other hand, a new trend in the literature on risk tolerance distinguishes between "subjective tolerance to risk", referring to attitude, and "objective tolerance to risk", based on investment behavior or decisions. Some authors argue that these are two different dimensions of risk tolerance, and even study the differences between them, which has been called "gap". Among the studies that have considered these two types of indicators of risk propensity, as well as the aforementioned gap, are Chang et al. (2004), Hallahan et al. (2004) and Marinelli et al. (2017).

The study has three objectives. Firstly, to know the tolerance to risk in terms of financial investments by Spanish families. Secondly, analyze the determining factors of the aforementioned tolerance. Thirdly, to determine if there are differences in the profile of

the families according to their level of subjective and objective risk tolerance, as well as in the gap between their attitude and behavior. For this, data has been collected from the Financial Survey of Families (hereinafter EFF) elaborated by the Bank of Spain for the year 2014 (last available), with a final sample of 2,093 households, in which the information necessary to configure the proposed measures can be found. Following previous studies (Chang et al., 2004; Hallahan et al., 2004; Marinelli et al., 2017), two indicators are proposed to distinguish between attitude and risk behavior; the subjective and the objective, as well as the consistency or coherence between both.

The work presents several contributions. In the first place, special reference is made to gender, to the extent of our knowledge of the first article that analyzes the Spanish market. Secondly, the study of risk tolerance is approached from a double perspective, subjective and objective, and the socio-demographic factors that determine both. Finally, the analysis of the gap between both measures of risk tolerance allows to analyze the consistency or coherence between the responses of individuals on their attitude to risk and the risk they have actually assumed in their financial investment decisions. This aspect is extremely useful for professionals who advise their clients, given the obligation to know their risk profile, as established by the Mifid regulations.

The chapter is structured in five sections. After the introduction, in the second section the theoretical arguments and hypotheses of the work are presented. Then, in the third section, the methodological aspects are detailed, with special reference to the proposed measures of risk tolerance. Fourthly, the results obtained are analyzed through a descriptive and econometric analysis. In the fifth and last section the results are discussed and conclusions are presented, as well as practical implications of the study.

3.2. THEORETICAL ARGUMENTS AND HYPOTHESES

Risk tolerance can be defined as an individual's willingness to take risks. More specifically, aversion to risk has been defined as the preference to obtain a guaranteed return on the probability of obtaining a higher expected value (Qualls and Puto, 1989). In the literature, the terms risk aversion or its opposite, propensity to risk or tolerance to financial risk are used interchangeably. The idea of risk aversion is based on the theory of utility, which refers to a set of alternatives between which a relationship of indifference and a preference relationship is defined for an individual who must make a decision. It measures the degree of satisfaction of an economic agent according to different levels of

risk. The relationship between risk and return is the basis of the theory of portfolios, initially proposed by Markowitz (1952), which argues that the behavior of an investor is characterized by its degree of risk aversion and the degree of profit maximization expected to be obtained. Investors can be classified into three types based on their risk aversion: adverse, prone or risk neutral. The main contribution of the theory of portfolios is that while the performance of a portfolio is given by the average of the returns of the assets that compose it, the risk can be reduced through an adequate diversification. It is assumed that investors adopt a rational behavior, that is, they prefer a portfolio that offers the maximum return for a level of risk or a portfolio that offers the minimum risk for an expected return. The prospect theory (Kahneman and Tversky, 1979), states that individuals have different perceptions of their possible losses and potential gains, which creates biases in behavior, especially aversion to losses. That is, they have a greater sensitivity to losses than to profits.

Given that risk aversion is not observable, studies have considered two ways of approaching this concept; a subjective type, based on the responses of individuals to questions related to their attitude in decision-making, and an objective one, generated from the investment decisions of individuals, that is, through the type of financial assets that they acquire, classified according to their level of risk (Chang et al., 2004; Marinelli et al., 2017). In this regard, Wood and Zaichkowsky (2004) indicate that there are different segments of investors depending on their attitude towards risk, each of which tends to buy different types of financial products (Shih and Ke, 2014). In their study on risk tolerance in Italy from the data provided by an Italian bank, Marinelli et al. (2017) consider the possible existence of a gap between both types of attitude -subjective and objective-, and they conclude that both are consistent among individuals. That is, investors who consider themselves risk adverse have portfolios of financial products with a low level of risk.

Numerous studies reveal that, in general, households are quite risk adverse, as in the case of Sweden (Palsson, 1996), Spain (Pérez-Perea, 2016) or the Netherlands (Noussair et al., 2013). In the case of India (Binswanger, 1980) households are moderately risk adverse. However, the results vary depending on the socio-demographic factors analyzed. For their part, Shih and Ke (2014), indicate that consumers who plan their long-term investments

make riskier investment decisions, while individuals who maintain a low risk profile show greater anxiety in their decisions.

Traditionally, it has been observed that the risk attitude of individuals varies depending on different socio-demographic aspects such as education (West and Worthington, 2013, Outreville, 2015), gender (Austen et al., 2010; George et al., 2018), income (Hartog et al., 2002; Jianakoplos and Bernasek, 2008), age (Lyons and Fisher, 2006; Pachur et al., 2017), marital status (Brunello, 2002; West and Worthington, 2014) or participation in a family business (Fairlie and Holleran, 2014; Herranz et al., 2015). Nonetheless, certain discrepancies have been found in previous studies, which may be motivated by the geographical context that in turn depends on cultural aspects, as well as the methodology used. West and Worthington (2013, 2014) studied the assumption of risks by Australian households and their relationship with socio-demographic aspects through the HILDA survey. Similarly, in the Italian survey on Income and Wealth of Households, Brunello (2000) analyzes the relationship between educational level and risk aversion. Díaz-Serrano (2005) also used the aforementioned Italian survey to study the relationship between risk aversion and uncertainty in income from work. On the other hand, Jianakoplos and Bernasek (2008) studied the risk aversion of households according to the wife's salary for American households, based on the data published by the Survey of Consumer Finances.

Subsequently, the theoretical arguments and hypotheses that relate the attitude to risk with its determining factors are presented. Given the objective of the present study, and in agreement with previous studies, the individual effect of the different factors (gender, income, level of studies, age, marital status, level of studies) is analyzed, with special reference to the possible moderating effect of the cited factors in the relationship between gender and risk tolerance. As indicated above, the tolerance towards risk has been studied in an interdisciplinary way from the economic perspective as well as from the view of psychology and sociology. The relationship between socio-demographic and economic variables is analyzed in the light of the arguments provided by the life cycle theory of saving (Ando and Modigliani, 1963), the social roles theory (Eagly, 1987), the socialization theory (Harris, 1995), as well as the theory of planned behavior (Azjen, 1991).

3.2.1. Gender and tolerance to risk

Among the different theoretical approaches that analyze tolerance to risk, the social roles theory (Eagly, 1987) and the socialization theory (Harris, 1995) are the ones that offer the main arguments for understanding differences according to gender. Social roles theory holds that the behaviors of women and men are influenced by the expectations associated with their roles imposed by society. The theory of socialization is based on the premise that the differences in socialization between genders, largely linked to work, means that these differences are transferred to the financial behavior of households. Traditionally, these differences in financial behavior of men and women, are related with the former being more prone to take greater risks (Miller and Stark, 2002). This theory suggests that women are more adverse to risk compared to men since they have more responsibility for their family and children (Kaur and Vohra, 2012).

From a psychological point of view, the theory of planned behavior (Ajzen, 1991) argues that the intention to perform a behavior can be predicted very closely by attitudes towards that behavior, subjective norms and by the perceived control over that behavior, so this theory can also be useful when measuring individuals' attitude. Thus, understanding the historical role of women in the home (currently in the process of change), one would expect women to have a more conservative financial behavior, in general, more adverse to risk. However, in industrialized societies, this division of labor and hierarchy of roles is becoming increasingly weak, both because of the decline in birth data and the lower use of physical force in jobs (Wood and Eagly, 2012).

Watson and McNaughton (2007) argue that women carry out more conservative investment strategies than men. Along the same lines, numerous studies support the belief that men are less risk adverse than women (Yao and Hanna, 2005; Watson and McNaughton, 2007; Wik et al., 2004; Jianakoplos and Bernasek, 2008; Sapienza et al., 2009; West and Worthington, 2013; 2014; George et al., 2018). On the contrary, Eckel and Grossman (2008) found no evident differences between genders, and Nelson (2015) did not find much difference in the attitude towards risk between sexes in the review carried out on previous works. On the other hand, Faff et al. (2011) emphasized the changing role of women in the management of household finances due to the increase in life expectancy and the increasing divorce rate.

Based on the arguments presented and the empirical evidence found, the first hypothesis is proposed in the following terms:

H1. Women are less willing to take financial risks than men.

3.2.2. Level of studies, gender and tolerance to risk

The financial decision making of individuals is generating a growing interest in part of the scientific community. In this regard, various public bodies and entities, such as the National Securities Market Commission or the Bank of Spain, have been developing financial education programs since 2008 (Bank of Spain website) to improve families' financial knowledge.

Higher education can help individuals to acquire skills necessary for the analysis and processing of information from financial markets (Jianakoplos and Bernasek, 2008; Lusardi and Mitchell, 2007; West and Worthington, 2013). These skills, which according to most previous studies are more necessary in those households with lower levels of studies, will allow individuals to make more effective decisions and contribute to diversify their investments (Austen et al., 2010) and increase their wealth (West and Worthington, 2013).

For some authors, risk aversion reduces as education increases, although this may be due to the high correlation between education, income and wealth (Riley Jr. and Chow, 1992). Likewise, the incidence of the level of studies in the attitude towards risk can be influenced by gender. In this regard, previous research has shown that households with a higher educational level, in the case of men, are more likely to acquire shares (Euwals et al., 2004).

Halek and Eisenhauer (2001) introduced a qualification regarding education and risk aversion, indicating that education increases pure risk aversion, although it increases the willingness to accept a speculative risk. Similarly, Cox et al. (2015) indicated that more educated households are less likely to commit financial errors.

Some studies have positively linked the higher education of parents with their children's willingness to take risks (Hartog et al., 2002; Dohmen et al., 2011). According to the theory of socialization (Harris, 1995), the possible influence of parents on the behavior of children is usually greater at early ages and then gradually diluted as children reach adulthood.

Most previous empirical studies have found a negative relationship between education and risk aversion (Riley Jr. and Chow, 1992; Guiso et al., 1996; Hartog et al., 2002; Harrison et al., 2007; Outreville, 2015; Balli et al., 2016). However, some authors have found that risk aversion is higher among the more educated (Hersch, 1996), while Jianakoplos and Bernasek, (1998) and Halek and Eisenhauer (2001) found no evidence that education produced any effect on the attitude towards risk.

Based on the arguments presented and the previous evidence, the second hypothesis is presented in the following terms:

H2. A higher educational level increases the financial risk tolerance.

Several previous studies have addressed the relationship between gender and education and risk tolerance, finding that being a woman and having a low educational level contributes to being more adverse to risk (Dwyer et al., 2002; Worthington, 2013). On the contrary, Hersch (1996) found a higher level of risk aversion among women and people with a high educational level. On the other hand, Rosen et al. (2003), found a greater influence of education than gender on the attitude towards risk. The third hypothesis includes the interaction between educational level and gender.

H3. Women with a higher educational level increase their financial risk tolerance compared to women with lower levels of education.

3.2.3. Age, gender and tolerance to risk

The relationship between age and attitude to risk has been studied from different angles, although the most used is the life cycle hypothesis of savings (Ando and Modigliani, 1963). This theory starts from the premise that a person consumes a constant percentage of their income during their life cycle, they are born without an inheritance in their favor and they die without leaving a legacy. This model helps to understand individuals' financial behavior and tolerance to risk based on their age, as well as their income, since it is foreseeable that, in the first years of their career, their income will be lower. Specifically, it assumes that individuals are more likely to borrow while they acquire education and skills, to later repay their debts and save for the future in the middle of their lives. During their retirement they spend their accumulated wealth and may not even leave a legacy. On the other hand, the increase in life expectancy may entail a change in the

financial behavior of households in terms of their investments, since, in the long-term, equity has traditionally provided higher returns to investors.

Previous studies have established a negative relationship between age and risk aversion, although, to a point close to 65 years, that is, the youngest and the oldest are the most adverse to risk (Halek and Eisenhauer, 2001 Olivares et al., 2008; Yao and Curl, 2011; West and Worthington, 2014). Likewise, the previous literature has shown a lower aversion to losses and a greater sensitivity to gains among older adults when detecting greater positivity in this segment of the population (Pachur et al., 2017). As of retirement age (65 years), risk aversion maintains a positive relationship with age. In the same way, from this age, investment in shares also falls (Riley Jr and Chow, 1992). In this regard, several authors agree that risk tolerance increases until retirement age and then progressively decreases with age (Riley Jr. and Chow, 1992; Halek and Eisenhauer, 2001, Olivares et al., 2008; Yao and Curl, 2011; West and Worthington, 2014).

On the other hand, authors such as Yao and Hanna (2005) have suggested from an economic and rational point of view that women and married individuals should tolerate greater financial risk to accumulate wealth with which to finance their longer lives.

According to the arguments and previous literature analyzed, the following relationships are predicted:

H4. The tolerance to financial risk is different depending on the age.

H5. Age moderates the relationship between gender and financial risk tolerance.

3.2.4. Income, gender and tolerance to risk

According to the theory of expected utility (Von Neumann and Morgenstern, 1944), preferences regarding risk can be modelled by the utility function. According to Rabin (2000), the utility function has a concave shape in relation to wealth, that is, the very poor and the very rich are more adverse than households with an average wealth. The difficulty to meet their expenses on the part of people with reduced income can make them more adverse to risk, to contracting risky products or to diversify their investments (Austen et al., 2010). A greater diversification of the investment portfolio is also considered as a prudent attitude towards risk (OECD, 2017). On the contrary, high revenues allow part of them to be used to make a long-term investment with the aim of obtaining additional profitability (West and Worthington, 2013).

Hallahan et al. (2004), found a positive relationship between income and propensity to take risks, while Riley Jr. and Chow (1992) found a positive relationship between income and propensity to take risks once the threshold of poverty has been reached but that again decreases significantly for the very rich. Also, they considered a greater propensity to the presence of risky assets with the growth of income. Along the same lines, West and Worthington (2013) found a positive relationship between income and risk propensity in their study conducted in Australia using the HILDA survey. In the same vein, among the previous studies that have linked the existence of low income with greater risk aversion are those of Hartog et al. (2002), Jianakoplos and Bernasek (2008) and Lusardi and Mitchell (2007).

According to the arguments presented and the empirical evidence found, the hypothesis H6 is stated in the following terms:

H6. Individuals with higher income have a greater financial risks tolerance.

On the other hand, the theory of socialization (Harris, 1995) suggests that the roles of each gender have been influenced by the divisions of work by sex, and that the reproductive capacity of women and the interruption of their professional career by motherhood can influence the existence of the gender wage gap. The fact that women usually have a lower salary than men may be the reason why, in general, women behave more adversely to risk. Likewise, the greater aversion to risk on the part of women can influence their remuneration, due to the differences found in the remuneration packages based on gender and the payment of shares (Carter et al., 2017).

Watson and McNaughton (2007) argue that women carry out more conservative investment strategies than men, with their lower incomes being the most important aspect that contributes to lower benefits for women during their retirement. Coupled with this, Bernasek and Shwiff (2001) add that, having a longer life expectancy, women are more financially vulnerable in the last stretch of their lives. Therefore, hypothesis H7 is stated:

H7. Women with higher incomes are more financial risks tolerance than women with low income levels.

3.2.5. Marital status, gender and tolerance to risk

Marital status has been considered as one of the family characteristics highlighted to explain the behavior of individuals. Literature has approached this relationship through

the theory of socialization (Harris, 1995), since the acquisition of knowledge and skills depends on their interaction with others in society. In terms of the theory of social roles (Eagly, 1987), the roles that are assigned to individuals by society influence their beliefs, attitudes and behaviors (Kaur and Vohra, 2012). In this regard, the investment behavior of women and men can be significantly influenced by their partner. In the case of heterosexual marriages and given that men adopt a riskier behavior with respect to investments, the presence of women can have a neutralizing effect on men. With regard to financial decision-making, this occurs to a greater extent the greater the share of the woman's salary in household income (Euwals et al., 2004).

According to Riley Jr. and Chow (1992), individuals who have never been married have a slightly lower level of risk aversion than other individuals, with widowers and separated individuals being more risk adverse. On the contrary, Guiso et al. (1996), Gutter et al. (1999) and Hartog, et al. (2002) found that married individuals were less risk-tolerant than unmarried individuals. In the same way, Halek and Eisenhauer, (2001), found that the assumption of risks was lower among married households than among those who maintained a different marital status.

According to the arguments and the evidence found, a positive relationship between the fact of being married and risk aversion is predicted, for which the eighth hypothesis is proposed:

> *H8. Married individuals, as well as those cohabiting, have lower financial risks tolerance than individuals with another marital status.*

However, some studies have found differences in the risk attitude of married people according to gender. In this way, previous studies reveal that men mitigate their financial ability to take risks during marriage, in the same way that married couples and couples with children are more risk adverse than single men (Euwals et al., 2004; Love and Smith, 2010; West and Worthington, 2014).

On the other hand, Austen et al. (2010) concluded that the asset portfolios of single women were less diversified than those of single men. Sung and Hanna (1996) established that single women had a lower risk tolerance than couples, although couples have a lower risk tolerance than single men. Yao and Hanna (2005) also analyzed the effect of marital status on risk-taking in the United States, concluding that risk tolerance is greater for

single men, followed by married men, then unmarried women and, last, for married women. Therefore, the hypothesis 9 is presented in the following terms:

> *H9. Married or cohabiting women have a lower financial risks tolerance than single women who do not live as a couple.*

3.2.6. Subjective risk tolerance, objective risk tolerance and gap

As indicated above, a new trend in the literature on risk tolerance distinguishes between "subjective risk tolerance", based on attitude and "objective risk tolerance", based on investment behavior or decisions. Some authors argue that these are two different dimensions of risk tolerance, and even study the differences between them, which has been called "gap". The analysis of the gap is interesting because it reveals the differences between what respondents say in relation to their attitude to risk and their decisions when making financial investments. This analysis is extremely useful for professionals who advise their clients, given the obligation to know their risk profile, as established by the Mifid regulations.

Specifically, the studies by Hallahan et al. (2004) and Marinelli et al. (2017) analyze the aforementioned gap. Hallahan et al. (2004) found a considerable variation in respondents' responses with a tendency to underestimate their risk tolerance. On the other hand, Marinelli et al. (2017), found inconsistencies in the responses between the tolerance to financial risk by individuals and the composition of their portfolio, these inconsistencies being greater among individuals with lower level of financial competence, higher income, without children and with risky financial behavior.

Therefore, based on the evidence found in previous studies, the last two hypotheses are presented in the following terms:

> *H10. The socio-demographic and economic variables that explain the risk tolerance can present different results depending on whether the subjective or objective tolerance to risk is analyzed.*
>
> *H11. The socio-demographic and economic variables that explain the risks tolerance can help explain the gap between subjective and objective tolerance to risk.*

Table 3.1 presents a synthesis of the hypotheses.

Table 3.1. Synthesis of the hypotheses

Nº	Statement	Prediction
H1	Women are less willing to take financial risks than men.	Negative
H2	A higher educational level increases the financial risk tolerance.	Positive
H3	Women with a higher educational level increase their financial risk tolerance compared to women with lower levels of education.	Positive
H4	The tolerance to financial risk is different depending on the age.	No prediction
H5	Age moderates the relationship between gender and financial risk tolerance.	No prediction
H6	Individuals with higher income have a greater financial risks tolerance.	Positive
H7	Women with higher incomes have more financial risks tolerance than women with low income levels.	Positive
H8	Married individuals, as well as those cohabiting, have lower financial risks tolerance than individuals with another marital status.	Negative
H9	Married or cohabiting women have a lower financial risks tolerance than single women who do not live as a couple.	Negative
H10	The socio-demographic and economic variables that explain the risk tolerance can present different results depending on whether the subjective or objective tolerance to risk is analyzed.	Differences between the two indicators
H11	The socio-demographic and economic variables that explain the risks tolerance can help explain the gap between subjective and objective tolerance to risk.	Variable significance in gap

Source: own elaboration

3.3. METHODOLOGICAL ASPECTS

3.3.1. Sample and source of information

The source of information used in this study has been the Financial Survey of Families, hereinafter referred to as EFF by its initials in Spanish. This is a survey conducted by the Bank of Spain on a three-year basis, the first corresponding to 2002 and the last to 2014. However, access to the database with the results of 2014 has been available from the end of 2017. The survey includes numerous modules among which we can find demographic variables, use of credit facilities, both financing and investment, as well as income and family assets. A characteristic of the survey is the over-representation of individuals and families with a high level of income. To do this, the selection of the sample part of the

information was provided by the Tax Agency. A detailed explanation of the methodology followed in the EFF-2014 can be found in Bover et al. (2018).

The EFF corresponding to 2014 contains responses from 6,120 families, although, since this study analyzes the propensity to make financial investments, it has been considered appropriate to select households whose expenses do not exceed their income, so therefore the sample is reduced to 2,223 families. In addition, two observations have been lost because there is no response to one of the demographic variables. Finally, in a previous descriptive analysis, it has been observed that some households (presumably by mistake) have very low incomes, which does not seem compatible with having the capacity to save. For this reason, observations with a family income of less than 12,000 euros per year have been eliminated. The final sample consists of 2,093 observations.

It should be noted that there are different variants of the EFF for the same year. This is due to the imputation of the securities made by the Bank of Spain in cases in which individuals do not respond to certain issues[1]. Finally, note that among the most recent studies based on this survey are those of Bover (2015), Pérez-Perea (2016), Sánchez-Martínez et al. (2016), Barceló and Villanueva (2016); Amuedo-Dorantes and Borra (2017); Pinilla et al. (2017). Regarding all of them, only the work of Pérez-Perea (2016) has addressed the aversion to risk of families in Spain. However, the present study does so in greater depth, with special emphasis on gender and creating different variables that allow to distinguish the subjective propensity and the objective propensity to risk.

3.3.2. Variables and estimation methods

Variables

Dependent variables

According to Marinelli et al. (2017), two financial risk indicators have been created, one subjective and the other objective. The first, called subjective risk tolerance (SRT), has been obtained by re-coding a specific question of the EFF relative to the attitude towards risk and the second, called objective risk tolerance (ORT), based on financial investment decisions adopted, that is, the holding of certain financial investments. Among the authors

[1] To know the methodology followed to perform the different imputations, consult Bover et al. (2018).

who have considered these two types of indicators of risk tolerance are Chang et al. (2004), Hallahan et al. (2004) and Moreschi et al. (2005).

Subjective risk tolerance (SRT)

Following the study of West and Worthington (2018), based on the HILDA survey, similar to the EFF, the aim is to approximate the risk profile of the subject based on the answers to question 9.11 of the EFF regarding respondents' willingness to assume financial risks when they save or make an investment. This question presents four possible answers, so it can adopt values from 1 to 4. In the EFF the 1 corresponds to the willingness to take many risks and 4 to not take financial risks. However, in the present work we have proceeded to recode the responses in an inverse manner, in order to interpret the value in the sense of the risk tolerance. However, in an exploratory analysis it is observed that the distribution of the answers presents an important bias, since 69% of the respondents affirm that they are not willing to assume any risk, 29% affirm that they are willing to assume some risk, somewhat 3% less than the value 3 (assuming enough risks) and less than 1% the value 4 (assuming many risks). Given these data, a dichotomous variable called subjective risk tolerance (SRT) has been created, assigning the value 0 when the individual is not willing to take risks and 1 in the rest of the cases (original values from 1 to 3; see Table A3.1 of the Appendix 3.1). The methodology followed for the creation of a dichotomous variable with respect to the subjective propensity to risk has been used by Fisher and Yao (2017).

Objective risk tolerance (ORT)

As indicated, this variable is based on the type of financial investments made by families. Shih and Ke (2014) classify financial assets into two levels of risk, assigning deposits and bonds to the low risk group, and shares, mutual funds and derivative products at high risk. In this study we have chosen to give an increasing score according to the risk. Specifically, savings or term deposits, fixed income securities (public or private), participation in investment funds or other collective investment entities and the shares of listed or unlisted companies have been considered[2]. Based on the answers to the questions

[2] Initially, the item of derivative products was also included, although it was decided to exclude it due to the small number of observations.

of the EFF regarding the acquisition of financial products (see Table A3.2 of the Appendix 3.1), the index called objective risk tolerance (ORT) has been created. The index has been prepared in such a way that each level corresponds to the product with the highest risk that the investor has contracted. Thus, the value 0 corresponds to individuals who do not have any financial product among their investments, the value 1 is assigned when the individual only has bank deposits or fixed income securities (public or private)[3] and the value 2 to those who have shares in mutual funds. Finally, the maximum value of 3 is assigned to those who invest in shares, regardless of whether they have investments in other lower risk products. Therefore, the index can adopt values from 0 to 3, as presented in Table 3.2 and is interpreted in a direct sense, that is, a higher value of the index reflects a greater objective tolerance to risk.

Table 3.2. Composition of the objective risk tolerance index (ORT)

Product purchased by the investor with the highest level of risk	Punctuation
Do not have investments in financial products	0
Savings or term deposits in credit institutions or Bonds: public or private fixed income securities	1
Funds: participation in investment funds or other collective investment entities	2
Shares of listed or unlisted companies	3

Source: own elaboration.

Among the authors that elaborate an indicator similar to the ORT, based on the asset holding, and specifically at the maximum level of risk of the financial assets they possess, are Chiang and Xiao (2017), who create a dichotomous variable that adopts the value 1 if the investor owns shares, considered as risk assets, and 0 otherwise.

Gap between subjective and objective risk tolerance (gap)

In order to analyze the possible existence of discrepancies between the attitude manifested by respondents to the question about his attitude to financial risk and the risk they take in holding financial assets, the gap variable is created. This is a dichotomous variable that

[3] Initially, the fixed income securities are included in a separate category, although when observing that the sample only contains less than 0.5% of cases in the same, it has been decided to integrate these households in the previous category (bank deposits).

adopts the value 0 if there is no discrepancy, for which it is required that if SRT = 0, the ORT = 0, or that if the SRT = 1 the ORT> 0. In any other case, discrepancy is considered to exist and the gap adopts the value 1.

Explanatory variables

According to the hypotheses proposed, the following explanatory variables have been considered:

Gender. The gender is collected through a dichotomous variable ***Woman***, which adopts the value one if the reference person is a woman and 0 if it is a man.

Education level. The level of studies refers to the highest level reached and is obtained through three dichotomous variables. The variable ***Il/Prim/Sec_Studies*** adopts the value 1 if the individual are iliterate or their highest level of level of primary or secondary training and zero otherwise (variable considered as a reference in the models). The variable ***Baccalaureate*** adopts the value 1 if the individual has completed the baccalaureate or an equivalent level of non-compulsory higher education and zero otherwise. Finally, the variable ***Higher_Studies*** adopts the value 1 if the individual has completed university studies, be it a first degree, a master's degree or a doctorate.

The ***age*** of the reference person has been introduced in the models in two alternative ways, as a continuous variable in the form of a logarithm, and by intervals or age groups. For this, following Bover et al. (2018), 4 dichotomous variables have been created, which adopt the value 1 if the age of the individual is within the following ranges: ***Age_18-34*** (used as a reference group in the models), ***Age_35-54***; ***Age_55-64*** *and* ***Age > 64***.

Family income **(*Income*).** The level of family income is a continuous variable provided by the database, although it has been created by the Bank of Spain adding aspects that represent different ways of obtaining such income, such as those from work, family businesses, investments, etc. This variable has been introduced in the model in the form of a logarithm.

Marital status. Is collected through the ***Married /Couple*** variable that takes the value 1 if the reference person is married and 0 for any other marital status (separated, divorced, widowed, etc.).

Estimation methods

The estimation method used depends on the nature of the dependent variable. In the case of subjective risk tolerance, as well as the gap, since it is a dichotomous variable, a logistic regression model is estimated, specifically the probit conditional probability model. In this type of non-linear model, the coefficients provided by the marginal effects should be analyzed, instead of the typical regressors of linear regression. Therefore, instead of the beta coefficients (linear regression), marginal effects are used. The variable used to measure the objective risk tolerance can adopt discrete values, greater than or equal to zero, in no case negative values. Therefore, it is convenient to estimate using the poisson regression model. Poisson regression is similar to multiple regression except that the dependent variable (Y) is a discrete count variable that follows a poisson distribution. Thus, the possible values of Y are non-negative, 0, 1, 2, 3, and so on, with high values being rare. In the present study, the models are estimated using the STATA 14 econometric package.

3.4. ANALYSIS OF SPANISH FAMILIES' FINANCIAL RISK TOLERANCE

3.4.1. Descriptive analysis

As indicated above, the subjective risk tolerance has been computed as a dichotomous variable, distributing in 69% the cases in which the respondent indicates that he is not willing to assume any risk and 31% those that are willing to assume some risk in order to achieve better returns. Therefore, it can be affirmed that Spanish families have a very low subjective tolerance to risk.

In terms of objective tolerance, according to the results shown in Table 3.3, it can be seen that just over 29% of the sample does not have investments in financial products in its portfolio, 20% only maintains term deposits or public or private fixed income securities, close to 6% have investment funds in their portfolio and 45% have acquired shares of companies, considered the riskiest product of the analyzed sample.

Table 3.3. Distribution of the objective risk tolerance index (ORT)

Product with the highest level of risk acquired by the investor	Punctuation	Nº	%	% accum.
Do not have investments in financial products	0	610	29,14	29,14
Savings or term deposits in credit institutions or Bonds: public or private fixed income securities	1	424	20,26	49,40
Funds: participation in investment funds or other collective investment entities	2	116	5,54	54,95
Shares of listed or unlisted companies	3	943	45,05	100

* Fixed-income securities represent less than 0.5% of the cases, which is why they have been included in the category of term savings deposits.

Source: own elaboration from EFF-2014

From the data obtained for both indicators of risk tolerance, it can be seen a considerable difference between the percentage of individuals who manifest their unwillingness to take risks (69%) and that, despite this, contract risky products. The most paradoxical data is that of stocks, which is the type of product with the highest risk and which is present in the portfolios of 45% of the sample. Based on the analysis carried out, a gap can be seen in just over 25% of the sample between the response given to the SRT and the hiring of financial investment products in its portfolio (ORT). This leads to an inconsistency between the two indicators coincident with some previous studies (Hallahan et al., 2004, Marinelli et al., 2017).

The sample distribution according to the different values of the variables that represent the tolerance to risk, for each of the explanatory variables, is presented in Table 3.4. From the data contained in the aforementioned Table, a profile can be extracted for each indicator. Thus, individuals with a lower subjective tolerance to risk are characterized, preferably, by being married women with non-university studies, with lower incomes. With regard to the objective tolerance to risk, there is a greater presence of women, with primary or secondary education among individuals with a lower tolerance to take risks when they make financial investment decisions. On the contrary, those who assume greater risks are mostly older married men, with higher education and higher income. Finally, there is a significant lower gap in the case of women, as well as in the case of respondents with all levels of studies and in the case of those married, the variable income not being significant for the gap's appearance.

Table 3.4. Distribution of the sample according to the risk tolerance
(Mean in continuous variables and percentage in dummy variables)

	Subjective risk tolerance		Objective risk tolerance				Gap		Average
Variables	**0**	**1**	**0**	**1**	**2**	**3**	**0**	**1**	
Woman	79,22	20,78	40,81	21,99	5,27	31,93	77,86	22,14	31,72
Il/Prim/Sec_Studies	83,82	16,18	43,72	29,78	3,10	23,41	83,65	16,35	9,99
Baccalaureate	74,24	25,76	31,85	24,14	5,48	38,54	74,85	25,15	23,55
Higher studies	57,61	42,39	19,53	12,95	6,97	60,55	69,87	30,13	48,69
Age (years)	60,21	60,84	55,52	60,59	58,65	63,70	59,24	63,90	60,41
Incomes (Th. Euros)	56	126	44	54	111	107	78	78	78
Married / Couple	66,85	33,15	28,08	19,82	5,82	46,28	74,90	25,10	70,62

Source: own elaboration from EFF-2014

Finally, Table A3.3 of the Appendix 3.2 contains the matrix of correlations and the VIF among the variables considered in the econometric models. As can be seen, the correlation between the indexes of objective and subjective risk tolerance is positive and has a reasonable correlation of 0.40. The higher the SRT indicator, the lower the gap, while the larger the ORT, the gap becomes larger. That is, the main difference is found among individuals who contract risky investment products, but they show their non-willingness to take risks. Regarding the correlations between the explanatory variables, only a relatively high value is observed, although lower than 0.50, between income and higher studies, being scarce in the rest. In addition, the VIF have values lower than 1.93. Therefore, multicollinearity problems do not arise.

3.4.2. Econometric analysis

In accordance with the hypotheses proposed, this section analyzes the incidence of socio-economic and demographic factors on the risk tolerance of Spanish families in the adoption of financial investment decisions. In addition, in order to contrast the hypotheses regarding the possible differences between the subjective and objective tolerance to risk, as well as the gap between both, all the hypotheses related to the explanatory factors will be contrasted, distinguishing between the subjective tolerance to take risks, the objective tolerance to take risks and the gap between both. In this way, it is possible that in some

cases a hypothesis will be accepted for some or all of the measures, which provides relevant information for financial entities and supervisory bodies in relation to compliance with the Mifid regulations.

First, Table 3.5 presents the results of the estimates related to the subjective tolerance to risk. According to previous studies, age and quadratic age are initially included (both in logarithm). As can be seen in model 1, the results are not significant for either of the two, so it proceded to estimate model 2 with age in groups, which are not significant either[4]. Finally, model 3 is presented with age in linear form. The results here are not significant either. In model 4, the variables that include the interaction between the woman and the rest of the variables are considered, and it is observed that none of the interactions are significant. Therefore, it is opted for model 3 which proposes an estimate with linear age without interactions. According to the results of this model, women and couples have a negative and significant sign, while higher studies and income are significant and positive. Baccalaureate studies and age are not relevant.

Following the same procedure, it proceded to analyze the explanatory variables of the objective tolerance to risk, that is, the tolerance to risk manifested in the holding of financial assets in the investment portfolio of families. The results are presented in Table 3.6. In the first place, as in the previous case, the estimation of model 5 is included, including age in a quadratic form, with none of the variables being significant. However, when introducing the age in groups, all the variables are significant and positive, which indicates that it is linear. In effect, in model 7 linear age is considered and it is significant and positive. In model 8 the interaction of the woman with the other variables is included, revealing the significance of some interactions. Therefore, in the explanation of the objective tolerance to risk, the model with interactions is considered.

The results of model 8 indicate that being a woman reduces the tolerance to risks, while a higher educational level, a higher age or a higher income contribute to assuming greater financial risks. However, the negative effect of the female variable is moderated by age and income, although it maintains the negative relationship with the maintenance of risky financial products when cohabiting.

[4] The model with cubic age has been estimated and neither of the variables is significant, results not reported

Table 3.5. Explanatory factors of the subjective risk tolerance in Spain

D.V.: SRT =1 if you are willing to take some financial risk and 0 if you are not willing to take any risk. Estimation method: probit

	Model 1	**Model 2**	**Model 3**	**Model 4**
	Quadratic age	Age in intervals	Linear age	Linear age and interactions
	M.E. *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*
Woman	-0,0932*** (0,0230)	-0,0964*** (0,0230)	-0,0931*** (0,0229)	-0,3010 (0,0395)
Il/Prim/Sec_Studies	Reference	Reference	Reference	Reference
Baccalaureate	0,0436 (0,0329)	0,0411 (0,0330)	0,0438 (0,0329)	0,0508 (0,0395)
Higher studies	0,1077*** (0,0292)	0,1043*** (0,0292)	0,1077*** (0,0292)	0,1203*** (0,0354)
Age (log)	0,1203 (1,1137)	-	0,0526 (0,0418)	0,0321 (0,0508)
Age^2 (log)	-0,0085 (0,1400)	-	-	-
Age 18-34	-	Reference	-	-
Age 35-54	-	0,0631 (0,599)	-	-
Age 55-64	-	0,0248 (0,0603)	-	-
Age >64	-	0,0762 (0,0573)		
Incomes (log)	0,1899*** (0,0159)	0,1934*** (0,0159)	0,1900*** (0,0158)	0,1909*** (0,0188)
Married/couple	-0,0481* (0,0258)	-0,0521** (0,0257)	-0,0478* (0,0254)	-0,0590* (0,0324)
Woman x Baccalaurate	-	-	-	-0,0151 (0,0684)
Woman x Hig_Studies	-	-	-	-0,0247 (0,0630)
Woman x Age (log)	-	-	-	0,0743 (0,0955)
Woman x Incomes	-	-	-	-0,0052 (0,0350)
Woman x Married	--	-	-	0,0380 (0,0549)
Observations	2.093	2.093	2.093	2.093
Pseudo R^2	0,1271	0,1283	0,1271	0,1277
Log likelihood	-1.299,09	-1.299,09	-1.299,09	-1.299,09

M.E., marginals effects (dy / dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration from EFF-2014

Table 3.6. Explanatory factors of the objective risk tolerance in Spain
D.V.: ORT, values from 0 to 4, a higher value indicates a greater financial risk tolerance
Estimation method: poisson

	Model 5	**Model 6**	**Model 7**	**Model 8**
	Quadratic age	Age in intervals	Linear age	Linear age and interactions
	β (S.E.)	*β (S.E.)*	*β (S.E.)*	*β (S.E.)*
Woman	-0,1897*** (0,0425)	-0,1905*** (0,0426)	-0,1888*** (0,0425)	-4,764*** (0,9053)
Il/Prim/Sec_Studies	Reference	Reference	Reference	Reference
Baccalaureat	0,3216*** (0,0563)	0,3158*** (0,0563)	0,3232*** (0,0562)	0,3133*** (0,0665)
Higher studies	0,4736*** (0,0515)	0,4582*** (0,0514)	0,4745*** (0,0515)	0,4511*** (0,0616)
Age (log)	2,2295 (2,0759)	-	0,8849*** (0,0753)	0,7086*** (0,0886)
Age^2 (log)	-0,1676 (0,2585)	-	-	-
Age 18-34	-	Reference	-	-
Age 35-54	-	0,3044** (0,1202)	-	-
Age 55-64	-	0,5144*** (0,1203)	-	-
Age >64	-	0,7385*** (0,1171)	-	-
Incomes (log)	0,2649*** (0,0225)	0,2708*** (0,0225)	0,2667*** (0,0223)	0,2260*** (0,0259)
Married/couple	-0,1285*** (0,0414)	-0,1401*** (0,0410)	-0,1240*** (0,0408)	-0,0442 (0,0509)
Woman x Baccalaureat	-	-	-	-0,0279 (0,1260)
Woman x Higher studies	-	-	-	0,1228 (0,1142)
Woman x Age (log)	-	-	-	0,6589*** (0,1784)
Woman x Incomes (log)	-	-	-	0,1748*** (0,0508)
Woman x Married	-	-	-	-0,1560* (0,0909)
Constant	-8,8991** (4,1264)	-3,1848*** (0,2572)	-6,2674*** (0,3888)	-5,1003*** (0,4526)
Observations	2.093	2.093	2.093	2.093
Pseudo R^2	0,0882	0,0867	0,0881	0,0932
Log likelihood	-3.171,45	-3.176,46	-3.171,65	-3.153,92

*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration from EFF-2014

As it has been shown in the descriptive analysis carried out previously, in approximately 25% of the cases, the respondents show a certain attitude towards risk while the risk revealed by the composition of their portfolios is different. Therefore, in addition to determining the variables that help explain the two types of risk tolerance, we study whether these variables explain the gap between the two. Following the same procedure as in the analysis of the individual indicators, in Table 3.7, the results related to the gap are presented. As in the previous cases, the model with the quadratic age is initially estimated. As they are not significant, it proceeded to propose the model with linear age, which is significant. Therefore, has opted to comment on the results of model 12.

As can be observed, in model 12 the variable women are negative and significant, which indicates that women act with greater coherence between what they affirm and what they do in terms of risk tolerance of their financial investments. The level of education and age maintain a positive and significant relationship with the existence of the gap. It is somewhat paradoxical that individuals with university studies are more likely to incur a gap. Income and marital status are not relevant per se. However, the interaction of women with income is positive, while the interaction of women with being married is negative. This can be interpreted in the sense that a high level of income on the part of women favours the appearance of the gap by reducing the coherence of their investments with respect to their attitude. Finally, the fact that women live in a couple or are married helps to reduce the presence of the gap, enhancing the coherence of their financial investment decisions.

Table 3.7. Explanatory factors of the gap between subjective and objective risk tolerance in Spain

D.V.: gap =1 if there are differences between the SRT and the ORT and 0 if there are no differences. Estimation method: probit

	Model 9	**Model 10**	**Model 11**	**Model 12**
	Quadratic age	Age in intervals	Linear age	Linear age and interactions
	M.E. *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*
Woman	-0.0132 (0,0220)	-0,0080 (0,0222)	-0,0135 (0,0219)	-0,7898*** (0,1477)
Il/Prim/Sec_Studies	Reference	Reference	Reference	Reference
Baccalaureat	0,1384*** (0,0325)	0,1431*** (0,0326)	0,1377*** (0,0324)	0,1421*** (0,0391)
Higher studies	0,1592*** (0,0266)	0,1572*** (0,0266)	0,1590*** (0,0266)	0,1442*** (0,0327)
Age (log)	-0,0406 (1,1000)	-	0,3045*** (0,0400)	0,2589*** (0,0487)
Age^2 (log)	0,0432 (0,1376)	-	-	-
Age 18-34	-	Reference	-	-
Age 35-54	-	-0,0080 (0,0551)	-	-
Age 55-64	-	0,9645 (0,0617)	-	-
Age >64	-	0,1770*** (0,0552)	-	-
Incomes (log)	0,0191 (0,0139)	0,0203 (0,0139)	0,0185 (0,0138)	-0,0036 (0,0164)
Married/couple	-0,0190 (0,0231)	-0,0191 (0,0229)	-0,0203 (0,0228)	0,0254 (0,0281)
Woman x Baccalaureat	-	-	-	-0,0352 (0,0580)
Woman x Higher studies	-	-	-	0,0550 (0,0633)
Woman x Age (log)	-	-	-	0,1519 (0,0927)
Woman x Incomes (log)	-	-	-	0,0824*** (0,0303)
Woman x Married	-	--	-	-0,0884** (0,0401)
Observations	2.093	2.093	2.093	2.093
Pseudo R^2	0,0446	0,0465	0,0446	0,0528
Log likelihood	-1.179,98	-1.179,98	-1.179,98	-1.179,98

M.E., marginals effects (dy / dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration from EFF-2014

3.4.3. Robustness analysis

As for robustness, estimates have been made for different subsamples. In the first place, a sample has been selected eliminating the households in which the respondents have declared that they have portfolios managed by third parties, leaving the sample at 1,926 households. Secondly, has been considered the sample of households that have made financial investments, reducing the number of observations to 1,483. Furthermore, it is possible that in households where the reference person is married or cohabiting, financial decisions are made by both members. In this sense, the results obtained on the financial decisions of households in the United States regarding risk, using data from year 2004 from the Survey of Consumer Finance (SCF), showed that in households in which both spouses have incomes, decision making is done jointly. Therefore, following West and Worthington (2014), has been considered the subsample of households in which the person of reference is not married nor has a domestic partner (singles). These represent approximately one third of the sample; 615 households.

In order to facilitate the robustness analysis, as in the previous models, the results of the estimates are presented grouped by the dependent variable. Thus, in Table 3.8 you can find the results of the models related to subjective risk (SRT), in Table 3.9 those corresponding to the objective index (ORT) and in Table 3.10 the models in which the dependent variable is the gap between both indexes.

In the first place, it should be noted that the results of the three robustness analyses are very similar in sign and significance, with the exception of the married/couple variable that loses its significance in model 14. These results confirm those obtained in model 3, which is considered a reference, since in the case of the SRT it has been decided to maintain the specification without interactions, since none of them is significant.

As for the models of robustness of the ORT, as in the previous case, it is observed that in the three subsamples the results are very similar in sign and significance (see models 16 to 18 in Table 3.9). Likewise, they confirm the results obtained in model 8, with the exception of the loss of significance of the woman-income interaction in model 17. It has been observed that the explanatory variables can predict more accurately the index ORT than the SRT indicator.

Table 3.8. Explanatory factors of the subjective risk tolerance in Spain. Robustness analysis

D.V.: SRT =1 if you are willing to take some financial risk and 0 if you are not willing to take any risk. Estimation method: probit

	Model 13	**Model 14**	**Model 15**
Sample	Without portfolios managed	With financial investments	Singles households
	M.E. *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*
Woman	-0,0777*** (0,0225)	-0,0884*** (0,0312)	-0,0963*** (0,0366)
Il/Prim/Sec_Studies	Reference	Reference	Reference
Baccalaureat	0,0416 (0,0322)	0,0687 (0,0431)	0,0989* (0,0561)
Higher studies	0,0925*** (0,0291)	0,1386*** (0,0375)	0,0808* (0,0492)
Age (log)	0,0120 (0,041)	0,0344 (0,0566)	0,0724 (0,0624)
Incomes (log)	0,1794*** (0,0165)	0,1849*** (0,0198)	0,1914*** (0,0268)
Married / couple	-0,0490** (0,0251)	-0,0508 (0,0323)	-
Observations	1926	1483	615
Pseudo R^2	0,1129	0,0959	0,1317
Log likelihood	-1.138,92	-995,51	-355,63

M.E., marginals effects (dy/dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration from EFF-2014

Finally, in the models referring to the gap, the results obtained in models 19 and 20 are similar to each other and similar to those provided by model 12, although, income is only significant in model 20, being an indicator that does not favour the appearance of the gap. However, in the subsample of single households the results differ significantly, only the woman and the woman-income interactions with a positive sign are maintained, favouring the appearance of the gap. However, in the three sub-samples the significance of the woman/ age with a positive sign is revealed, which indicates that the female and older group is more prone to the appearance of the gap.

Table 3.9. Explanatory factors of the objective risk tolerance in Spain. Robustness analysis

D.V.: ORT, values from 0 to 4, a higher value indicates a greater financial risk tolerance.
Estimation method: poisson

	Model 16	**Model 17**	**Model 18**
Sample	Without portfolios managed	With financial investments	Singles Households
	β *(S.E.)*	*β* *(S.E.)*	*β* *(S.E.)*
Woman	-5,4592*** (1,0014)	-2,3611** 0,9696	-4,3020*** (1,3883)
Il/Prim/Sec_Studies	Reference	Reference	Reference
Baccalaureat	0,3279*** (0,0683)	0,1785*** 0,0665	0,4178*** (0,1324)
Higher studies	0,4486*** (0,0642)	0,2672*** (0,0614)	0,3376** (0,1342)
Age (log)	0,7394*** (0,0930)	0,1995** (0,0888)	0,7064*** (0,1560)
Incomes (log)	0,2448*** (0,0287)	0,0822*** (0,0272)	0,3205*** (0,0604)
Married / couple	-0,0430 (0,0531)	-0,0339 (0,0509)	-
Woman x Baccalaureat	-0,0619 (0,1300)	-0,0888 (0,1255)	-0,1720 (0,1956)
Woman x Higher studies	0,1062 (0,1179)	0,0553 (0,1134)	0,1146 (0,1831)
Woman x age (log)	0,7116*** (0,1878)	0,4142** (0,1780)	0,5760** (0,2620)
Woman x incomes (log)	0,2206*** (0,0587)	0,0542 (0,0551)	0,1697* (0,0872)
Woman x married	-0,1290 (0,0945)	0,0056 (0,0901)	-
Constant	-5,4405*** (0,4820)	-1,0305** (0,4728)	-6,0929*** (0,8679)
Observations	1.926	1.483	615
Pseudo R^2	0,0952	0,0216	0,1022
Log likelihood	-2.876,67	-2.228,25	-910,17
*, **, *** Significant at 10%, 5% and 1%, respectively			

Source: own elaboration from EFF-2014

Table 3.10. Explanatory factors of the gap between subjective and objective risk tolerance in Spain. Robustness analysis

D.V.: gap =1 if there are differences between the SRT and the ORT and 0 if there are no differences. Estimation method: probit

	Model 19	**Model 20**	**Model 21**
Sample	Without portfolios managed	With financial investments	Singles households
	M.E. *(S.E.)*	*M.E.* *(S.E.)*	*M.E.* *(S.E.)*
Woman	-0,7986*** (0,1612)	-0,7046*** (0,1817)	-0,9996*** (0,0021)
Il/Prim/Sec_Studies	Reference	Reference	Reference
Baccalaureat	0,1418*** (0,0397)	0,1497*** (0,0490)	0,1231 (0,0774)
Higher studies	0,1449*** (0,0343)	0,1414*** (0,0425)	0,0885 (0,0714)
Age (log)	0,2772*** (0,0503)	0,1814*** (0,0658)	0,1253 (0,0815)
Incomes (log)	0,0131 (0,0178)	-0,0643*** (0,0216)	0,0187 (0,0362)
Married / couple	0,0196 (0,029)	0,0462 (0,0372)	-
Woman x Baccalaureat	-0,0478 (0,0576)	-0,0637 (0,0801)	-0,0288 (0,0952)
Woman x Higher studies	0,0438 (0,0638)	0,0685 (0,0835)	0,0866 (0,1031)
Woman x age (log)	0,1568 (0,0965)	0,1556 (0,1280)	0,3389** (0,1373)
Woman x incomes (log)	0,0775** (0,0336)	0,0667 (0,0416)	0,0972* (0,0520)
Woman x married	-0,0714* (0,0430)	-0,0878 (0,0591)	-
Observations	1.926	1.483	615
Pseudo R^2	0,0587	0,0223	0,0634
Log likelihood	-1.087,97	-964,39	-347,20

M.E., marginals effects (dy / dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration from EFF-2014

3.5. DISCUSSION OF RESULTS AND CONCLUSIONS

In this study, two risk tolerance measures have been proposed, of which the aim is to determine, on one hand, the attitude towards the risk of Spanish households and, on the other hand, to evaluate the incidence of socio-demographic factors in this attitude, with special reference to gender. The first indicator, called subjective risk tolerance (SRT) is a dichotomous variable that takes the value 1 if individuals are willing to take risks in order to obtain benefits and 0 if they are not willing to assume any financial risk. In Spain, 69% of individuals say they are unwilling to take financial risks whereas 31% are willing to take some risk. The objective risk tolerance index (ORT) takes values of 0 if they have not acquired any financial product, 1 if they maintain term deposits or fixed income bonds, 2 if they have contracted investment funds and 3 if they have invested in shares. The results show that at least 70% of the sample contracts an investment product of which at least 45% contracts the riskiest product among those analyzed, such as stocks. Both indices show a correlation of 40.48%, which indicates that the response given by the respondents in relation to their tolerance to risk is not reflected to a large extent in their investment decisions.

The analysis of the explanatory factors of risk tolerance allows us to conclude first that there are differences in the variables that explain the subjective and the objective risk tolerance. Specifically, a greater explanatory power of the socio-demographic variables in the objective tolerance to risk has been observed. This means that in some cases the hypotheses are accepted partially.

The econometric results allow the conclusion that women have a lower tolerance to assume financial risks. These results offer support for the arguments provided by the theory of social roles and coincide with the preceding literature. Specifically, Wik et al. (2004), Yao and Hanna, (2005), Watson and McNaughton (2007), Jianakoplos and Bernasek (2008), Sapienza et al. (2009); West and Worthington (2013, 2014) and George et al. (2018), also concluded that women are more risk-adverse than men. Therefore, hypothesis H1 is accepted.

The level of education (except for the baccalaureate in the SRT) shows a positive relationship with the tolerance to risks. This can be explained because a higher level of studies facilitates the acquisition of skills to process financial information, as stated by Jianakoplos and Bernasek (2008), Lusardi and Mitchell (2007) or West and Worthington

(2013), among others. These results are in line with the majority of previous studies, which have found a negative relationship between education and risk aversion (Riley Jr. and Chow, 1992; Guiso et al., 1996; Halek and Eisenhauer, 2001; Hartog et al., 2002, Harrison et al., 2007; Outreville, 2015; Balli et al., 2016). Thus, the H2 hypothesis is accepted.

Age is positive in both indicators, although it is only significant in the objective tolerance to risk, that is, the willingness to take risks when acquiring financial products. This indicates that a higher age increases the willingness to take risks in the acquisition of financial products, presumably due to the accumulated experience. However, previous studies have mostly obtained a non-linear relationship, in the sense that middle-aged individuals are more likely to take risks, while younger or older individuals are more risk-averse. Among the studies that have found the aforementioned non-linear relationship are Halek and Eisenhauer (2001), Yao and Curl (2011) and West and Worthington (2014). Hypothesis H4 is accepted partially.

Income also presents a positive relationship with the SRT and the ORT. This indicates that higher incomes favor the assumption of risks both subjectively and objectively. This can be interpreted in the sense that the disposition of greater volume of income facilitates the assumption of risks by being able to afford to assume losses in their case. In addition, they offer support for the arguments of Austen et al. (2010), who affirm that the difficulty of facing expenses on the part of people with reduced income can make them more averse to the risk, to contract risky products or to diversify their investments. These results coincide with those found in previous studies such as Riley Jr. and Chow (1992), Hallahan et al. (2004) or West and Worthington (2013). The results obtained with respect to marital status also coincide with those found in previous studies, such as Guiso et al. (1996), Gutter et al. (1999) and Hartog et al. (2002), which conclude that married individuals are less risk tolerant than non-married individuals. Therefore, hypothesis H6 is accepted.

The consideration of the possible moderating effect of the rest of the variables in the relationship between gender and risks tolerance has revealed the importance of income, age and marital status, the level of education being not relevant. Specifically, higher incomes and an older age contribute to riskier financial behavior on the part of women. Therefore, in the case of women, obtaining higher income and experience gained with older age helps reduce their aversion to risk. The fact that women usually have a lower

salary than men may be the reason why, in general, women show a behavior more adverse to risk. In this regard, Watson and McNaughton (2007) argue that the lower level of income of women in relation to men explains that they carry out more conservative investment strategies.

On the contrary, married women see their risk aversion enhanced, presumably because of the greater responsibility of the domestic economy imposed by their role in society. These results are in line with those obtained by Yao and Hanna (2005) which concluded that risk tolerance is higher in single men, followed by married men, unmarried women and, finally, for married women. Therefore, hypotheses H5, H7 and H9 are accepted, albeit partially, since they are only significant in the objective risk tolerance, and hypothesis H3 regarding the woman-educational level interaction is rejected.

As indicated above, the socio-demographic and economic variables considered have a greater explanatory power in the case of objective than in the case of subjective risk tolerance, so that the H10 hypothesis is accepted. These results are in line with those found by the few studies that have considered the two types of indicators, such as Hallahan et al. (2004) and Marinelli et al. (2017). The latter found inconsistencies in the responses between the tolerance to financial risk by individuals and the composition of their portfolio.

Finally, in relation to the gap, it has also been shown that some of the variables contribute to explain the differences between both risk indicators. Specifically, women have a negative relationship with the gap, which indicates that they are more consistent than men are with their decisions, not favouring the emergence of the gap, except when they have high income. This result coincides with that obtained by Marianelli et al. (2017), who find greater inconsistencies in the responses between the tolerance to financial risk by individuals and the composition of their portfolio, among individuals with higher incomes. On the contrary, older individuals are more likely to incur the gap, having observed a positive relationship with the index, also a higher level of education (with the exception of the baccalaureate in the SRT) favours the appearance of the gap. Accordingly, Halek and Eisenhauer (2001) argue that education increases pure risk aversion, but increases the willingness to accept speculative risks; these are precisely those that can occur in the case of investment in shares, especially if it concerns listed

companies in the stock markets. According to the results obtained, hypothesis H11 is accepted.

A summary of the results is presented in Table 3.11.

Table 3.11. Explanatory variables of risk tolerance in Spain. Synthesis of results

N	Explanatory variable	Prediction	Results	Acceptance/Rejection
H1	Woman	Negative	Negative	Accepted
H2	Educational level	Positive	Positive	Accepted
H3	Woman–Educational level	Positive	n.s.	Rejection
H4	Age	No prediction	Positive (ORT) n.s. (SRT)	Partially accepted
H5	Woman-age	No prediction	Positive (ORT) n.s. (SRT)	Partially accepted
H6	Incomes	Positive	Positive	Accepted
H7	Woman-incomes	Positive	Positive (ORT) n.s. (SRT)	Partially accepted
H8	Married/couple	Negative	Negative (ORT) n.s. (SRT)	Partially accepted
H9	Woman/couple	Negative	Negative (ORT) n.s. (SRT)	Partially accepted
H10	Diferences SRT-ORT	Differences between the two indicators	Yes	Accepted
H11	Gap explanation	Significance of the variables in the gap	Yes	Accepted

n.s.: non significant

Source: own elaboration

As indicated in the introduction, the paper presents several contributions. In the first place, to our knowledge, it is the first study on tolerance or predisposition to risk in Spain in which special reference is made to gender. According to the results obtained, women, individuals with lower educational levels and lower income, and younger married men and women are the groups with fewer predispositions to take financial risks. Although some of these variables are not significant with respect to the SRT indicator, they are significant with respect to the ORT. This suggests that they might require greater financial training and the increase in life expectancy and uncertainty of the pension system may require greater financial long-term planning, which would enable them to earn higher returns assuming certain risks in their financial investments.

Secondly, it is the first study that addresses the study of risk tolerance from a double perspective, subjective and objective, as well as the gap between both of them. This allows us to know the consistency or coherence between the responses of individuals about their attitude to risk and the risk they have actually assumed in their financial investment decisions. Based on the results obtained, it can be concluded that Spanish households are quite averse to risk in their financial decisions when asked about their financial investments. However, these results do not coincide with those obtained in relation to the portfolios of financial products maintained by Spanish families. Therefore, there is an inconsistency that affects more than 25% the sample, who, when making financial investment decisions, show a greater tolerance to risks. This is revealed in response to the question about attitude to risk. These results are in line with those found by Chang et al. (2004), Hallahan et al. (2004), Ehm et al. (2014) and Marinelli et al. (2017), who have detected the existence of this gap between subjective and objective risk tolerance regarding financial investments.

In addition, the results obtained have important implications for professionals in the financial sector, specifically banking advisors and employees. As noted above, the Mifid II regulation that entered into force in January 2018, and its antecedent MiFID I, requires professionals who market financial products to meet the risk profile of their clients, in order to prevent them making investment decisions without being aware of the level of risk they assume. In this sense, it is of vital importance for these professionals to take into account the possible discrepancy between the responses referring to the attitude towards risk and the investment decisions adopted. The results of the present study allow us not only to elaborate a profile of the investors in terms of their subjective attitude or their subjective tolerance to risk, but also to detect the characteristics that define the individuals with greater propensity to incur the aforementioned gap. Specifically, men and individuals with baccalaureate or higher education are more likely to incur the gap than women or individuals with lower levels of education. Therefore, it is suggested that financial professionals pay special attention to this type of client in order to avoid subsequent claims. Also, the results are useful for agencies responsible for designing the questionnaire tests that customers must pass, according to those rules, since the possible existence of a gap between the response to a question about attitude to risk may not reflect the reality of financial decisions made.

Another interesting contribution of the study is that it has allowed for an understanding of the profile of individuals that do not maintain any financial product among their investments. Among these, there is a greater presence of women, with primary or secondary education. According to Hanna and Lindamood (2004), those individuals who have not previously contracted investment products may be too conservative when hiring new products so, in order to obtain higher income for retirement, a positive specific training could be addressed for these individuals. This may be of interest to organizations concerned with improving the level of financial competence among the population.

Finally, the work is not without limitations. On one hand, the failure to consider the possibility for individuals to make their financial decisions based on the advice of experts, instead of their own attitude towards risk. In this regard, some authors such as Cox et al. (2015), among others, argue that more educated households are more likely to seek advice from an external advisor. An attempt has been made to limit the effect of this by carrying out the robustness analyses in which the individuals who have shown that they maintain managed portfolios are eliminated, although it is possible that in other cases individuals adopt their decisions based on the advice of friends or relatives, which is not possible to take into account with the available information. On the other hand, some previous studies have considered the objective tolerance to risk based on the composition of the portfolios of financial assets, in monetary terms. In the present study this has not been considered opportune due to the small number of responses in the EFF-2014 with complete information regarding the amount invested in the different types of assets. However, the criterion followed to assign individuals to an objective risk level based on the maximum level of risk which is based on the assets acquired, has been supported in previous studies.

REFERENCES

Agnew, S. and Harrison, N. (2015). Financial literacy and student attitudes to debt: A cross national study examining the influence of gender on personal finance concepts. *Journal of Retailing and Consumer Services, 25,* 122-129.

Ajzen, I. and Fishbein, M. (1980). Understanding attitudes and predicting social behaviour. Prentice Hall.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Amuedo-Dorantes, C. and Borra, C. (2017). Emerging wealth disparities after the storm: evidence from Spain. *Review of Economics of the Household*, 1–31.

Ando, A. and Modigliani, F. (1963). The "life cycle" hypothesis of saving: Aggregate implications and tests. *American Economic Review, 53*(1), 55-84.

Austen, S., Jefferson, T. and Ong, R. (2010). Gender comparisons of asset and debt portfolios in Australia. In *39th Australian conference of economist's proceedings*. Economic Society of Australia.

Balli, F., Pericoli, F. M. and Pierucci, E. (2016). Channels of risk sharing at micro level: Savings, investments and risk aversion heterogeneity. *International Journal of Finance and Economics, 21*(1), 90-104.

Bank of Spain (2018). Website of Bank of Spain. https://www.bde.es/bde/es/

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359-373.

Barceló, C. and Villanueva, E. (2016). The response of household wealth to the risk of job loss: Evidence from differences in severance payments. *Labour Economic*. 39, 35–54.

Bernasek, A.and Shwiff, S. (2001). Gender, risk, and retirement. *Journal of Economic Issues, 35*(2), 345-356.

Binswanger, H. P. (1980). Attitudes toward risk: Experimental measurement in rural India. *American Journal of Agricultural Economics, 62*(3), 395-407.

Bover, O. (2015). Measuring expectations from household surveys: new results on subjective probabilities of future house prices. Bank of Spain. Working Papers, 1535: 361–405.

Bover, O., Crespo, L., Gento, I., 2018. The Spanish survey of household finances (eff): description and methods of the 2014 wave. Bank of Spain. Occasional documents, 1804.

Brunello, G. (2002). Absolute risk aversion and the returns to education. *Economics of Education Review*, *21*(6), 635-640.

Carvalho, L. S., Prina, S. and Sydnor, J. (2016). The effect of saving on risk attitudes and intertemporal choices. *Journal of Development Economics*, *120*, 41-52.

Carter, M. E., Franco, F. and Gine, M. (2017). Executive gender pays gaps: The roles of female risk aversion and board representation. *Contemporary Accounting Research*, *34*(2), 1232-1264.

Chang, C. C., DeVaney, S. A. and Chiremba, S. T. (2004). Determinants of subjective and objective risk tolerance. *Journal of Personal Finance*, *3*(3), 53-67.

Chiang, T. F. and Xiao, J. J. (2017). Household characteristics and the change of financial risk tolerance during the financial crisis in the United States. *International Journal of Consumer Studies*, *41*(5), 484-493.

Cox, R., Brounen, D. and Neuteboom, P. (2015). Financial literacy, risk aversion and choice of mortgage type by households. *The Journal of Real Estate Finance and Economics*, *50*(1), 74-112.

Diaz-Serrano, L. (2005). On the negative relationship between labour income uncertainty and homeownership: Risk-aversion vs. credit constraints. *Journal of Housing Economics*, *14*(2), 109-126.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J. and Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, *9*(3), 522-550.

Dwyer, P. D., Gilkeson, J. H. and List, J. A. (2002). Gender differences in revealed risk taking: evidence from mutual fund investors. *Economics Letters*, *76*(2), 151-158.

Eagly, A. H. (1987). Reporting sex differences. *American Psychologist*, 42(7), 756-757.

Eckel, C. C. and Grossman, P. J. (2008). Men, women and risk aversion: Experimental evidence. *Handbook of Experimental Economics Results*, *1*, 1061-1073.

Ehm, C., Kaufmann, C. and Weber, M. (2014). Volatility inadaptability: Investors care about risk, but cannot cope with volatility. *Review of Finance*, *18*(4), 1387-1423.

Euwals, R., Eymann, A. and Börsch-Supan, A. (2004). Who determines household savings for old age? Evidence from Dutch panel data. *Journal of Economic Psychology*, *25*(2), 195-211.

Faff, R., Hallahan, T. and McKenzie, M. (2011). Women and risk tolerance in an aging world. *International Journal of Accounting and Information Management*, *19*(2), 100-117.

Fairlie, R. W. and Holleran, W. (2012). Entrepreneurship training, risk aversion and other personality traits: Evidence from a random experiment. *Journal of Economic Psychology*, *33*(2), 366-378.

Fama, E. F. (1965). The behavior of stock-market prices. *The journal of Business*, *38*(1), 34-105. George, E. E., Hansen, M. E. y Routzahn, J. L. (2018). Debt Tolerance, Gender, and the Great Recession. *Journal of Consumer Affairs*, *52*(3), 711-732.

Fisher, P. J. and Yao, R. (2017). Gender differences in financial risk tolerance. *Journal of Economic Psychology*, *61*, 191-202.

George, E. E., Hansen, M. E. and Routzahn, J. L. (2018). Debt Tolerance, Gender, and the Great Recession. *Journal of Consumer Affairs*, *52*(3), 711-732.

Guiso, L., Jappelli, T. and Terlizzese, D. (1996). Income risk, borrowing constraints, and portfolio choice. *The American Economic Review*, 158-172.

Gutter, M. S., Fox, J. J. and Montalto, C. P. (1999). Racial differences in investor decision making. *Financial Services Review*, *8*(3), 149-162.

Hallahan, T. A., Faff, R. W. and McKenzie, M. D. (2004). An empirical investigation of personal financial risk tolerance. *Financial Services Review-Greenwich-*, *13*(1), 57-78.

Halek, M. and Eisenhauer, J. G. (2001). Demography of risk aversion. *Journal of Risk and Insurance*, 1-24.

Hanna, S. D., Gutter, M. S. and Fan, J. X. (2001). A measure of risk tolerance based on economic theory. *Journal of Financial Counseling and Planning*, *12*(2), 53.

Hanna, S. D. and Lindamood, S. (2004). An improved measure of risk aversion. *Journal of Financial Counseling and Planning*, *15*(2), 27-45.

Harris, J. R. (1995). Where is the child's environment? A group socialization theory of development. *Psychological review*, *102*(3), 458.

Harrison, G. W., Lau, M. I. and Rutström, E. E. (2007). Estimating risk attitudes in Denmark: A field experiment. *Scandinavian Journal of Economics*, *109*(2), 341-368.

Hartog, J., Ferrer-i-Carbonell, A. and Jonker, N. (2002). Linking measured risk aversion to individual characteristics. *Kyklos*, *55*(1), 3-26.

Herranz, N., Krasa, S. and Villamil, A. P. (2015). Entrepreneurs, risk aversion, and dynamic firms. *Journal of Political Economy*, *123*(5), 1133-1176.

Hersch, J. (1996). Smoking, seat belts, and other risky consumer decisions: Differences by gender and race. *Managerial and decision economics*, *17*(5), 471-481.

Jianakoplos, N. A. and Bernasek, A. (1998). Are women more risk averse? *Economic inquiry*, *36*(4), 620-630.

Jianakoplos, N. A. and Bernasek, A. (2008). Family financial risk taking when the wife earns more. *Journal of Family and Economic Issues*, *29*(2), 289-306.

Kahneman, D. and Tversky, A. (1979). On the interpretation of intuitive probability: A reply to Jonathan Cohen. *Cognition*, *7*(4), 409-411.

Kaur, M. and Vohra, T. (2012). Understanding individual investor's behavior: A review of empirical evidences. *Pacific Business Review International*, *5*(6), 10-18.

Litner, J. (1972). The Valuation of Risk Assets and Capital Market Equilibrium. *Studies in the Theory of Capital Markets (, M. C. Jensen, ed.). New York: Praeger*.

Love, D. A. and Smith, P. A. (2010). Does health affect portfolio choice? *Health Economics*, *19*(12), 1441-1460.

Lusardi, A. and Mitchell, O. S. (2007). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, *54*(1), 205-224.

Lyons, A. C. and Fisher, J. (2006). Gender differences in debt repayment problems after divorce. *Journal of Consumer Affairs*, *40*(2), 324-346.

Machauer, A. and Morgner, S. (2001). Segmentation of bank customers by expected benefits and attitudes. *International Journal of Bank Marketing*, *19*(1), 6-18.

Marinelli, N., Mazzoli, C. and Palmucci, F. (2017). Mind the gap: inconsistencies between subjective and objective financial risk tolerance. *Journal of Behavioral Finance*, *18*(2), 219-230.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, *7*(1), 77-91.

MiFID, I. I. (2014). Directive 2014/65/EC of the European Parliament and of the Council.

Moreschi, R. W. (2005). An analysis of the ability of individuals to predict their own risk tolerance. *Journal of Business and Economics Research*, *3*(2), 39-48.

Mossin, J. (1966). Equilibrium in a capital asset market. *Econometrica: Journal of the Econometric Society*, 768-783.

Von Neumann, J. and Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. Pincenton University Press.

Nelson, J. A. (2015). Are women really more risk-averse than men? A re-analysis of the literature using expanded methods. *Journal of Economic Surveys*, *29*(3), 566-585.

Noussair, C. N., Trautmann, S. T. and Van de Kuilen, G. (2013). Higher order risk attitudes, demographics, and financial decisions. *Review of Economic Studies*, *81*(1), 325-355.

OECD (2017), G20/OECD INFE report on adult financial literacy in G20 countries.

Olivares, J. A., Diaz, D. and Besser, M. (2008). Gender and portfolio choice: Are women more risk averse when selecting pension funds. In *FMA Annual Meeting, Reno, Nevada. Retrieved from http://69.175* (Vol. 2).

Outreville, J. F. (2015). The relationship between relative risk aversion and the level of education: a survey and implications for the demand for life insurance. *Journal of Economic Surveys*, *29*(1), 97-111.

Pachur, T., Mata, R. and Hertwig, R. (2017). Who dares, who errs? Disentangling cognitive and motivational roots of age differences in decisions under risk. *Psychological science*, *28*(4), 504-518.

Pålsson, A. M. (1996). Does the degree of relative risk aversion vary with household characteristics? *Journal of Economic Psychology*, *17*(6), 771-787.

Pérez Perea, I. (2016). Las finanzas de los hogares: riqueza y participación de los hogares en los mercados financieros con riesgo. Doctoral Thesis Universidad Pontificia de Comillas, Available at: https://repositorio.comillas.edu/xmlui/handle/11531/9754

Pinilla, J.G., López-Valcárcel, B. and Urbanos-Garrido, R.M. (2017). Estimating direct effects of parental occupation on Spaniards' health by birth cohort. *BMC Public Health* 17, 26.

Qualls, W. J. and Puto, C. P. (1989). Organizational Climate and Decision Framing An Integrated Approach to Analysing Industrial Buying Decisions. *Journal of Marketing Research*, *26*(2), 179-192.

Rabin, M. (2000). Diminishing marginal utility of wealth cannot explain risk aversion.

Riley Jr, W. B. and Chow, K. V. (1992). Asset allocation and individual risk aversion. *Financial Analysts Journal*, *48*(6), 32-37.

Rosen, A. B., Tsai, J. S. and Downs, S. M. (2003). Variations in risk attitude across race, gender, and education. *Medical Decision Making*, *23*(6), 511-517.

Sánchez-Martínez, M.T., Sanchez-Campillo, J. and Moreno-Herrero, D. (2016). Mortgage debt and household vulnerability: evidence from Spain before and during the global financial crisis. *International Journal of Housing Markets and Analysis*, 9 (3), 400–420.

Sapienza, P., Zingales, L. and Maestripieri, D. (2009). Gender differences in financial risk aversion and career choices are affected by testosterone. *Proceedings of the National Academy of Sciences*, *106*(36), 15268-15273.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, *19*(3), 425-442.

Shih, T. Y. and Ke, S. C. (2014). Determinates of financial behavior: insights into consumer money attitudes and financial literacy. *Service Business*, *8*(2), 217-238.

Sung, J. and Hanna, S. D. (1996). Factors related to risk tolerance. *Financial Counselling and Planning, 7*, 11-19.

Watson, J. and McNaughton, M. (2007). Gender differences in risk aversion and expected retirement benefits. *Financial Analysts Journal*, *63*(4), 52-62.

West, T. and Worthington, A. C. (2013). A Canonical Correlation Analysis of Financial Risk-Taking by Australian Households. *Consumer Interests Annual*, *59*, 1-4.

West, T. and Worthington, A. C. (2014). Personal attributes and financial risk-taking in Australia. *JASSA*, (1), 25.

West, T. and Worthington, A. C. (2018). Synthesizing an Index of Financial Literacy Using Not-For-Purpose Survey Data. *Economic Notes: Review of Banking, Finance and Monetary Economics*, *47*(2-3), 331-352.

Wik, M., Aragie Kebede, T., Bergland, O. and Holden, S. T. (2004). On the measurement of risk aversion from experimental data. *Applied Economics*, *36*(21), 2443-2451.

Wood, R. and Zaichkowsky, J. L. (2004). Attitudes and trading behavior of stock market investors: A segmentation approach. *Journal of Behavioral Finance, 5*(3), 170-179.

Yao, R. and Curl, A. L. (2011). Does market return influence risk tolerance? Evidence from panel data. *Journal of Family and Economic Issues*, *32*(3), 532-544.

Yao, R. and Hanna, S. D. (2005). The effect of gender and marital status on financial risk tolerance. *Journal of Personal Finance*, 4(1), 66-85.

Zinkhan, G. M. and Karande, K. W. (1991). Cultural and gender differences in risk-taking behavior among American and Spanish decision makers. *Journal of Social Psychology, 131*(5), 741-742.

APPENDIX 3.1. QUESTIONS EFF-2014

Questions from the EFF-2014 used for the subjective risk tolerance indicator

P.9.11. With which of the following statements does your household identify more in terms of the amount of financial risk you are willing to take when saving or making an investment?

• Take many risks while waiting for many benefits 1

• Assume enough risks waiting to obtain benefits above normal 2

• Assume medium risks while waiting to obtain average benefits 3

• They are not willing to take financial risks 4

Table A3.1. Questions of subjective risk tolerance (SRT)

		EFF Question	
Variable	**Values**	**Code**	**Values**
They are not willing to take financial risks.	0	9.11	4.Yes
Take medium risks while waiting for average benefits.	1	9.11	3.Yes
Assume enough risks waiting to obtain benefits above normal.	1	9.11	2.Yes
Take many risks while waiting for many benefits.	1	9.11	1.Yes
SRT	0-1		

Source: own elaboration

Questions from the EFF-2014 used for the objective risk tolerance index

P.4.1. Do you have accounts in financial institutions in your home (i.e, banks, savings banks, etc.), including current accounts, passbooks, savings deposits, term deposits, sight deposits, deposits, housing savings accounts?

P.4.33. Do they have public fixed-income securities (such as treasury bills, bonds and government bonds, securities issued by other public administrations, etc.) or private fixed-income securities (such as promissory notes, bonds and bonds issued by private companies, etc.)?

P.4.10. Do you own shares in companies listed on the stock exchange?

P.4.18. Do you own shares or other forms of participation in companies that are not listed on the stock exchange?

P.4.27. Do you hold shares in mutual funds or other collective investment institutions in your home (excluding pension funds)?

Table A3.2. EFF items used to elaborate the objective risk tolerance index

	ORT	**EFF Question**	
Variable	**Puntuaction in ORT**	**Code**	**Values**
Do not have investments in financial products	0		
Savings or term deposits in credit institutions	1	7.9	1.Yes ; 2.Not
Bonds: public or private fixed income securities	1	4.33	1.Yes ; 2.Not
Funds: participation in investment funds or other collective investment entities	2	4.27	1.Yes ; 2.Not
Shares of listed or unlisted companies	3	4.10 and 4.18	1.Yes ; 2.Not

Source: own elaboration

APPENDIX 3.2. CORRELATION MATRIX AND VIF

Table A3.3. Matrix of correlations and VIF

	1	2	3	4	5	6	7	8	9	10	11	12
VIF	-	-	-	1,13	1,54	1,92	1,05	-	-	-	1,45	1,14
1. SRT	1											
2. ORT	0,4047***	1										
3. Gap	-0,3902***	0,5389***	1									
4. Woman	-0.1533***	-0,1993***	-0,0470**	1								
5. Baccalaureate	-0,0652***	-0,0671***	0,0003	-0,0324	1							
6. Higher studies	0,2354***	0,3134***	0,1122***	-0,0807***	-0,5407***	1						
7. Age (log)	0,0309	0,2404***	0,1434***	-0,0899***	-0,1138***	-0,0620***	1					
8. Age_35_54	-0,0085	-0,1844***	-0,1302***	0,1181***	0,1217***	0,0340	-0,6467***	1				
9. Age_55-64	0,0177	0,0313	0,0051	-0,0628***	0,0194	0,0393*	0,0273	-0,3489***	1			
10. Age > 64	0,0108	0,1923***	0,1328***	-0,0654***	-0,1311***	-0,0597***	0,7739***	-0,5815***	-0,4669***	1		
11. Incomes (log)	0,3718***	0,4263***	0,0955***	-0,2269***	-0,0958***	0,4611***	-0,0013	-0,0092	0,1359***	-0,0771***	1	
12. Married	0,0654***	0,0450**	-0,0011	-0,2770***	-0,0028	0,0617***	-0,0217	0,0646***	0,0395*	-0,0462**	0,2489***	1

*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration

CHAPTER 4.

EDUCATIONAL LEVEL AND INTERNET BANKING

4.1. INTRODUCTION

In the last decade there has been an exponential growth in the number of the users that have Internet at home; this has posed an opportunity for Banks to drive many of their traditional banking operations towards Internet banking. According to the Survey on Equipment and Use of Information Technologies and Communication in Homes 2017, prepared by INE, the number of people who used the Internet is 29.3 million; 54% of these people use the Internet for the online banking service.

The Internet has become a new marketing channel that allows companies to have a greater degree of penetration than maintaining a network of physical establishments. In the banking sector, this break with the previous paradigm has allowed the entry of new competitors specializing in providing services almost exclusively through the Internet. These services have been offered under more advantageous conditions than traditional banking, due to the savings implied by the absence of a heavy cost structure such as the costs of overheads, furniture, maintenance, personnel, etc. within a traditional bank office.

On the other hand, the economic crisis that began in 2008 has led to a major restructuring of the banking sector, with the concentration of entities and the consequent closure of offices and reduction of staff. According to data from the Spanish Banking Association (AEB), the number of national entities in Spain fell from 88 in 2000 to 48 in 2016, while the number of foreign entities rose from 51 to 82, maintaining an inverse trend to that of the local entities. Also according to the data extracted from the Statistical Yearbook that the AEB publishes annually, between 2007 and 2016 banks closed 3,338 branches and the number of employees in the sector decreased by 22,573 people. These data contrast with the increase in debit and credit cards, which in 2016 amounted to 40,331,339; 16.6% more than in 2007. The evolution of credit / debit cards is related to the growing prominence of online shopping. E-commerce has experienced significant growth, and is another factor that has favoured the increase in demand for Internet banking services (Tunay et al., 2015). According to the Survey on Equipment and Use of Information and Communication Technologies of 2017, the number of online shoppers in Spain rose to more than 17 million people.

The peculiarities of the Internet, and its immensity as a market, have contributed to numerous researchers focusing on the study of the behaviour of both consumers and

companies. According to Internet World Stats, as of June 2017, the internet penetration ratio in the world was 54.4%, while in Europe it was 80.2% and in Spain it was 87.1%.

Given this scenario, financial institutions are giving great importance to digitization and the installation of machinery to replace part of the work used in the handling of cash, such as the installation of ATMs in which to make income and invoice payments, in addition to the already known cash withdrawals. The banking sector has been a pioneer in the adoption of new technologies. The first self-service technology in the financial sector appeared in the 70s when banks installed the first ATMs. Later, in the 80s, telephone banking appeared; the 90s saw the dawn of Internet banking and by the year 2000 mobile phone banking was being developed. The proliferation of these channels has allowed banks to develop a multichannel strategy (Hernández-Murillo et al., 2010, Hoehle et al., 2012). The first ATM was introduced by Barclays Bank in 1967 (Polasik and Wisniewski, 2009). The first bank to allow online transactions was in California: the Wells Fargo in 1995. In the same year the first virtual bank without offices was established: the Security First Network Bank (De Young et al., 2007; Polasik and Wisniewski, 2009). Likewise, the banking sector was one of the first to adopt the Internet as a new channel of relationship with its customers. However, according to Garcia and Romero (2004), this channel has not met banks' expectations in terms of attracting new customers, although it has been recognised as an effective means of consolidating the client portfolio.

Studies focused on knowing consumer behaviour are increasingly important for financial institutions since competition can be global, which tends to reduce the benefit of the entities. Therefore, the securing and maintenance of clients will be vital for their survival. Specifically, the behaviour of the online consumer is occupying a greater number of studies, mainly those related to the purchase intention, while the continuity of the client closely follow. Internet banking is one of the influential aspects in the relationship between the client and the financial institution.

Given the advantages for both parties, there is a great incentive on the part of financial institutions to encourage the use of Internet banking. According to Chiou and Shen (2012), financial institutions should take advantage of the relationship built in offline environments to influence customers and their intention to use services through the Internet. Likewise, the services offered via the Internet must have complementary support. In this sense, the decision to offer online services is currently perceived as vital

to retain customers and maintain a competitive advantage (Polasik and Wisniewski, 2009). Internet banking improves competitiveness in the banking sector by allowing the comparison of offers between different financial entities (Tunay et al., 2015). Currently, the trend among banks is to consider Internet banking as a complementary service to traditional banking that allows them to face the rapid changes and intense international competition (Sadiq-Sohail and Shanmugham, 2003, Santouridis and Kyritsi, 2013).

The objective of this study is to determine the factors that explain the use of Internet banking in Spain, in particular those related to the characteristics of users with special reference to educational level, both its direct impact and through its influence on other economic and sociodemographic factors, such as income, age and gender. For this, the database provided by the Bank of Spain created from the Financial Survey of Families is used, corresponding to the year 2014, the latest available to date.

The work is structured as follows. After this introduction, section two presents a synthesis of the advantages and disadvantages of Internet banking for users. In the third one, the theoretical arguments and hypotheses that relate the aforementioned factors to the use of Internet banking are included. The fourth section is dedicated to exposing the methodological aspects while the results are presented in the fifth. Finally, in the sixth section a discussion of the results is carried out and the conclusions of the study are presented.

4.2. ADVANTAGES AND DISADVANTAGES OF INTERNET BANKING FOR CUSTOMERS

The Internet banking services offer a series of advantages for the clients: possibility of the user to control their bank accounts from any place and at any time, the facility to compare between different alternatives of investment / financing and the saving of time and costs[1]. Montazemi and Qahri-Saremi (2015) hope that Internet banking will have a so-called effect on consumers through cost savings, greater control over the service provided, reduced waiting times and access to services without space or time restrictions. In relation to costs, the Portuguese Association for consumer protection conducted a study in which concluded that users of Internet banking could save up to $ 300 per year if they

[1] Polatoglu and Ekin (2001), Suganthi et al. (2002); Ainin et al. (2005) cited in Lassala et al. (2010).

used Internet banking instead of traditional (cited in Martins et al., 2014). However, as the complexity of the products grows, human contact is more important (Durkin et al., 2008).

The main disadvantages or reasons that discourage the use of Internet banking are related to the difficulty of use perceived by customers as well as security. The main barriers found by Mattila et al. (2003) were the perceived difficulty in the use of computers and the lack of personal attention in Internet banking (Akinci et al., 2004). Most users who do not adopt the use of Internet banking claim that it is complicated, despite having experience in the use of the Internet and they are concerned about the safety of it (Mansumitrchai and Chiu, 2012). According to Gensler et al. (2012), the products that are used more frequently do benefit from being carried out online (such as transfers), although the effect of online use is less pronounced in the case of those customers who have savings accounts. Another factor that represents an inconvenience for the use of Internet banking is the preference of clients for personal treatment from bank employees, in order to seek advice. In this regard, Aldas-Manzano et al. (2009) state that lack of human contact can be a barrier in the use of technology-based services. According to Chiou and Shen (2012), if customers have a close relationship with a bank employee, they may be reluctant to use Internet banking.

4.3. THEORETICAL ARGUMENTS AND HYPOTHESIS

Internet banking, besides being a marketing channel for banking products and services, represents the use of a computer technology which requires certain knowledge on the part of users. Some authors argue that individuals with high levels of internet use are more likely to adopt Internet banking (Corrocher, 2006; Kim et al., 2005). Others add that the use of electronic banking is more common among those clients who feel comfortable using computers (Corrocher, 2006, Kim et al., 2005, Giordani et al., 2014).

From a theoretical point of view, studies have used the so-called TAM (Technology Acceptance Model, Davis et al., 1989), according to which ease of use and perceived utility are the most relevant factors to explain the propensity to adopt a new technology

(Chiou and Shen, 2012)[2]. In the same way, Chong et al. (2010) consider that both these factors, ease of use and perceived utility, are related. As Montazemi and Qahri-Saremi, (2015) affirm, the less effort that consumers hope to put in when using the technology, the greater utility they will perceive from it.

In the reviewed literature a certain consensus has been reached in affirming that the ease of use is positively related to the adoption of Internet banking (Mattila et al., 2003, Wang et al., 2003, Chong et al., 2010). In this sense, some authors conclude that the perceived difficulty and lack of personalized attention is the most significant barrier to the adoption of Internet banking (Hanafizadeh et al., 2014). According to Boateng et al. (2016), the adoption of a technology is influenced by the social environment of the individual and their knowledge and beliefs about what it can provide to aid their personal goals.

In this sense, regardless of the ease of use derived from the web chosen by the bank, it can be stated that the degree of difficulty perceived by a client is closely related to their level of knowledge, which affects their ability to be able to understand the information provided regarding the products and banking services offered, and therefore their ability to make decisions about it. However, the studies by Pikkarainen et al. (2004) and Eriksson et al. (2005) indicate that the perception of ease of use does not influence the adoption of Internet banking (Chong et al., 2010).

Finally, another of the aspects highlighted in the studies on the use of Internet banking refers to the trust or security perceived by users. In this sense, numerous authors maintain that trust is crucial in Internet banking (Hernández and Mazzon, 2007, Chong et al., 2010, Boateng et al., 2016). A client cannot have a positive attitude towards Internet banking if he believes there is a risk of exposing his personal credit data and exposing himself to fraud (Chiou and Shen, 2012). The Internet users who rely most on Internet banking are those who use its services most frequently and are therefore those who show greater loyalty to such services (Lassala et al., 2010). In the same way, Boateng et al. (2016) considers that the adoption of Internet banking is based on trust, among other factors such

[2] This model has been tested in different situations explaining the acceptance of new technologies. Chiou and Shen (2012) cite the studies of Taylor and Todd (1995), Venkatesh and Davis (1996) and Legris et al. (2003).

as the characteristics of the website, ease of use, compatibility with lifestyle and online customer service.

In this paper we try to determine the factors that influence the decision to use Internet banking, with special reference to the financial knowledge of the individual, which is approximated by the educational level. Among the most prominent factors in previous studies are socio-demographic and economic ones, which in turn contribute to explain educational level, so, unlike previous studies, in this paper we propose to state that educational level exerts a moderating effect among the other factors and the use of Internet banking.

However, the use of electronic banking requires access to a computer, as well as being familiar with the use of the internet. Hence, before focusing on the arguments that relate each of the factors to the use of Internet banking, a reference is made to the relationship of the aforementioned variable with the use of the internet, if applicable.

A high level of internet diffusion, income and education shows a receptive market for the introduction of Internet banking (e.g., Lassar et al., 2005, Corrocher, 2006, Santouridis and Kyritsi, 2014). The use of the Internet is related to age, educational level, occupation, employment in the services sector and GDP per capita, as well as the frequency in the use of the internet which is positively related to broadband connection, education, gender and size of the population in which the user resides (Lera-Lopez et al., 2011). According to these authors, despite its economic development, Spain maintains a low internet use, as occurs in some southern European economies.

Therefore, the central hypothesis of the work is stated; educational level and use of Internet banking, and subsequently arguments regarding different economic and demographic factors will be considered, as well as the possibility of an interaction effect between the educational level and each of these factors.

4.3.1. Educational level and use of Internet banking

As indicated above, the use of any computer technology in the field of Internet requires certain knowledge and skills both to navigate the Internet and to be able to understand the information displayed which must be processed in order to make decisions. In this sense, an objective measure of the level of knowledge is educational level.

According to the Theory of Diffusion (Rogers, 2003), the most educated individuals tend to achieve a higher economic and professional status, being also prone to adopt innovations such as the Internet. Some studies have found empirical evidence of the existence of a positive relationship between the level of income and educational level (Lera-López et al., 2011). In addition, several studies support that an increase in education tends to be positively related to the adoption of an innovation (Karjaluoto et al., 2002). In this way, Giordani et al. (2014), express that individuals with a higher level of education (and income) have greater exposure to new technologies, so they are more prone to the adoption of Internet banking. Specifically, these authors find that university education is positively related to the use of Internet banking.

According to Lera-López et al. (2011), educational level has a great impact on the likelihood of Internet use, people with secondary education are 38% more likely to become an Internet user than individuals who have not been educated to that level. According to these authors, a higher education increases the probability of using the Internet by 61%. In the same vein, Polasik and Wisniewski (2009) reveal that customers with a higher education who are familiar with the use of the Internet are more likely to use Internet banking. The study carried out by Polatoglu and Ekin (2001), through a survey of Turkish consumers, shows that the best educated (and youngest) clients perceive the Internet as very useful and easy to use, which gives them an advantage over the conventional office banking (Hoehle et al., 2012). Kolodinsky et al. (2004) find that the current and expected future users of online banking have higher income, a higher level of education and are younger. Along the same lines, Hernández and Mazzon (2007) found that university graduates were more likely to use Internet banking.

Numerous studies have found that clients with high levels of education are more likely to adopt Internet banking compared to clients with lower educational levels. Among them are those of Rice and Katz (2003), Lawson and Todd (2003), Corrocher (2006), Kim et al. (2005), Hernández and Mazzon (2007), Ono and Zavodny (2007), Goldfarb and Prince (2008), Polasik and Wisniewski (2009).

According to Sullivan (2000), there is a higher demand for internet banking among clients with a higher level of education compared to the rest of clients. Similarly, the study carried out by Akinci et al. (2004), reached the conclusion that the segment of "highly educated" customers deserves special attention from banks, since it is a low cost segment

and very profitable. Being a part of the population accustomed to the use of the Internet, it will be less expensive for the bank to migrate them to the use of Internet banking than amongst those with a lower educational level.

> *H1. Individuals with higher education are more likely to use Internet banking than individuals with lower educational levels.*

However, as indicated, the results obtained in some of the previous studies link this relationship with other economic and demographic factors, so the possibility of a joint effect of the educational level with these variables is considered below.

4.3.2. Level of income, educational level and use of Internet banking

The use of the Internet is associated with the level of income, among other reasons due to the fact that there is probably a lower penetration of computers in the lower strata of the population (Polasik and Wisniewski, 2009). Another argument that relates income to the use of the internet stems from the fact that an increase in income (and in education) tends to be positively related to the adoption of an innovation (Karjaluoto et al., 2002). Lera-López et al. (2011) affirm that the use of the Internet is associated, among other variables, with a high GDP per capita.

Regarding the use of Internet banking, Giordani et al. (2014) state that banking clients with a higher level of income (and a higher educational level) are more exposed to new technologies and are more likely to adopt Internet banking. In addition, Kim et al. (2005) found that customers with higher levels of income attribute greater value to their time and that electronic banking allowed them to save time so they were more prone to use it (Giordani et al., 2014).

Numerous studies have obtained a positive relationship between the use of electronic banking and a high level of income. Thus, Mattila et al. (2003) find that household incomes (and education) have a significant effect on the adoption of electronic banking among Finnish consumers. Kolodinsky et al. (2004) conclude that current and future users of computer banking have higher incomes, more education and are younger. In the study carried out by Flavián et al. (2006) it could be inferred that a person was less likely to use electronic banking if their salary was less than 24,000 euros, compared to someone with a higher salary. Corrocher (2006) concluded that a high degree of Internet diffusion,

income and education indicated the existence of a market very receptive to the entry of Internet banking services.

Contrary to the conclusions of most studies, Santouridis and Kyritsi (2014) found an inverse relationship between high income and the use of Internet banking. The justification for this idea was based on the fact that these customers could be involved in transactions of larger and more complex volume so they preferred to solve them in face-to-face meetings.

From the empirical evidence mentioned, it can be deduced that not only does the level of income affect the decision to adopt Internet banking, but that in many cases the educational level seems to act as a moderator of the relationship. Hence, the following hypothesis is raised in the aforementioned terms:

> *H2. Individuals with a higher level of income are more likely to use Internet banking.*
>
> *H3. Individuals with a higher level of income and a higher educational level are more likely to use Internet banking.*

Finally, in relation to family income, the possibility is considered that the family is the owner of a business and specifically that the exercise of economic activity is carried out as an individual or autonomous entrepreneur, as an individual, instead of creating a commercial society. In this sense, Lawson and Todd (2003) came to the conclusion that the self-employed were more likely to adopt the services of Internet banking, since this segment of clients has to direct all work related to banks by themselves. Due to their time constraints they will be open to the use of new technologies (Giordani et al., 2014).

> *H4. Individuals who exercise a business activity are more likely to use Internet banking.*

4.3.3. Demographic aspects, educational level and use of Internet banking

Age, educational level and Internet banking

Given that the use of Internet banking requires a certain willingness to use the internet, in principle young people would be more likely to use Internet banking. Polatoglu and Ekin (2001) came to the conclusion that younger and better educated clients perceived the Internet as very useful and easy to use.

Many authors have analysed the relationship between age and the use of Internet banking. The results obtained mostly support that younger customers are more inclined to adopt Internet banking than older customers. Among the most cited are those of Polatoglu and Ekin (2001), Rice and Katz (2003), Akinci et al. (2004), Kim et al. (2005), Chang (2003), Flavian et al. (2006), Hernández and Mazzon (2007), McKeown et al. (2007), Goldfarb and Prince (2008), Hanafizadeh et al. (2014), Kolodinsky et al. (2004).

In addition, the fact that not only Internet is used to access the website of a bank to make inquiries, but also to perform operations (transfers, etc.), carries a certain risk. As Gan et al. (2006), older consumers are more risk adverse and prefer a personal banking relationship to a non-personal one. Therefore, age can condition the use of Internet banking. In this line, other authors argue that the most innovative consumers tend to be younger and that a part of the mature segment may perceive the technologies as confusing or stress inducing (Im et al., 2003; Elder et al., 1987; in Polasik and Wisniewski, 2009). The degree of receptivity of the innovation and the perceived risk in the purchase are factors that determine how quickly an Internet user becomes an online buyer (Citrin et al., 2000, Vrechopoulos et al., 2001, Aldas-Manzano et al. 2009).

Some studies specify a selection of age. Thus, Flavián et al. (2006) find that within the age group, those who are between 17 and 25 are more likely to make transactions via the Internet, while those aged 45 and older are less likely. The Marktest Group classified that, males between 25-34 who are upper middle class have an adoption rate 2.5 times above the average, with 74% of users of online banking (cited in Martins et al., 2014).

Some studies raise a profile of the user of Internet banking. In this way, Polasik and Wisniewski (2009), in their study about Poland outline that the typical client who has an online account is a 34-year-old man with 15 years of education, who performs office tasks and lives in a city with a population average of about 620,000 inhabitants. Hernandez and Mazzon (2007) conclude that young men who own a computer, have university degrees and higher than average incomes are more likely to adopt Internet banking. These variables do not play a very important role in the intention to use or in the continuity of their use, only in their adoption.

In agreement with the adduced arguments, as well as the previous empirical evidence, the first hypothesis is presented in such a way that age is contemplated and also conditioned by the educational level.

H5. Younger clients are more likely to use Internet banking.

H6. Younger and more educated clients are more likely to use Internet banking.

Gender, educational level and use of Internet banking

First, as in the case of age, the relationship between gender and the adoption of Internet banking is conditioned by a predisposition to the use of the internet. In this sense, Lera-Lopez et al. (2011) find that the use of the internet is slightly higher in men than in women (around 8%) and that the difference is greater the higher the level of education, specifically, among individuals with higher education the use of the Internet reaches 87.5%.

Regarding the use of Internet banking, Polasik and Wisniewski (2009) argue that gender has a significant importance in the decision to direct operations online. In the same line, Flavian et al. (2006) and Lera-López et al. (2011) state that women were less likely to carry out Internet banking activities, which may be associated with differences in education and income and the distribution of domestic tasks (Bimber, 2000).

Among studies that have found evidence of less use by women than men are those of Bimber (2000), Karjaluoto (2002), Lawson and Todd (2003), Akinci et al. (2004), Kolodinsky et al. (2004), Kim et al. (2005), McKeown et al. (2007), Polasik and Wisniewski (2009). Finally, Hernández and Mazzon, (2007) found that young men with higher education and higher incomes are more likely to adopt electronic banking. However, other authors (Rice and Katz, 2003, Goldfarb and Prince, 2008) have not found differences between sex and the use of Internet banking. In any case, according to Lera-López et al. (2011: 7): "it seems that the differences by gender are being reduced as the use of the internet becomes popular".

In accordance with the above, the following hypothesis is proposed:

H7. Men are more likely than women to use Internet banking.

H8. Men with higher education are more likely than women to use Internet banking.

Marital status, educational level and use of Internet banking

The family structure, and in particular, marital status can affect the use of the internet. In this sense, married clients as a rule request more complex transactions and therefore are

more likely to adopt Internet banking (Sohail and Shanmugham, 2003). However, Lee-Kelley et al. (2003) found no relationship between marital status and preference for making purchases online. It is possible that this discrepancy depends on the educational level, so the following hypotheses are proposed:

H9. Married individuals are more likely to use Internet banking.

H10. Married individuals with a higher educational level are more likely to use Internet banking.

4.3.4. Means of payment, banking operations and use of Internet banking

Currently, the use of electronic banking is also linked to the lifestyle of people, the way they think, act and live (Hernández and Mazzon, 2007). In this sense, the preferences of banking clients determine their habits or behaviours in their relationships with entities. Thus, with regard to the most common means of payment, it has been shown that customers who have a credit card or who use checks adopt more Internet banking than those who simply maintain savings accounts (Gensler et al., 2012).

However, there is still a great preference for the use of cash. Each month, 73% of Europeans use ATMs, while only 30% use Internet banking (Hoehle et al., 2012). The study by Akinci et al. (2004) reveals that, for users of Internet banking, this is the preferred channel followed by ATMs, while non-users prefer ATMs.

Another aspect of the study is the periodicity or frequency of the operations carried out by banking clients. In this regard, Estrella-Ramón et al. (2016), find that customers who adopt Internet banking faster have an offline behaviour with a greater frequency of interactions, rather than a high number of products involved in their interactions or the purchase of high risk products or high monthly obligation.

H11. Greater use of credit cards is associated with greater use of Internet banking.

H12. Greater use of ATMs reduces the use of Internet banking.

H13. Greater frequency of banking operations increases the use of Internet banking.

The Table 4.1 show a synthesis of hypothesis.

Table 4.1. Synthesis of hypotheses

Nº	Statement	Predicted relationship
H1	Individuals with higher education are more likely to use Internet banking than individuals with lower educational levels.	Positive
H2	Individuals with a higher level of income are more likely to use Internet banking.	Positive
H3	Individuals with a higher level of income and a higher educational level are more likely to use Internet banking.	Positive
H4	Individuals who exercise a business activity are more likely to use Internet banking.	Positive
H5	Younger clients are more likely to use Internet banking.	Negative
H6	Younger and more educated clients are more likely to use Internet banking.	Negative
H7	Men are more likely than women to use Internet banking.	Positive
H8	Men with higher education are more likely than women to use Internet banking.	Positive
H9	Married individuals are more likely to use Internet banking.	Positive
H10	Married individuals with a higher educational level are more likely to use Internet banking.	Positive
H11	Greater use of credit cards is associated with greater use of Internet banking.	Positive
H12	Greater use of ATMs reduces the use of Internet banking.	Negative
H13	A greater frequency of banking operations increases the use of Internet banking.	Positive

Source: own elaboration

4.4. METHODOLOGICAL ASPECTS

4.4.1. Information sources and sample

The source of information used to carry out this study is the Financial Survey of Families, hereinafter EFF, prepared by the Bank of Spain. This survey is of three-year periodicity, the first one is the one related to 2002 and the last one available is of 2014. It is worth noting that the Banco de España Studies Service anticipates the results of this survey in different formats in an aggregate form, although access to the database for researchers is only available from December 2017. The survey consists of multiple sections or modules. Among the different sections are those of demographic variables, relations with banking entities and the use of Internet banking. Regarding economic variables, the EFF presents a multitude of questions related to heritage (housing, jewellery, financial assets, etc.), as

well as debts, and in particular provides the variable income of the household, created from the aggregation of the different incomes (of work, business, investments, etc.).

A characteristic of the EFF is that it has a bias towards individuals / families with a high income level. To do this, the initial selection of respondents is done based on the declaration of the 2011 wealth tax, provided by the Tax Agency. A detailed explanation of the methodology used in EFF2014 can be found in Bover et al. (2018).

The EFF corresponding to 2014 contains the responses of 6,120 families, although the module relating to the use of Internet banking is answered by 4,316. Therefore, the initial sample of the present study consists of 4,316 observations. However, due to the existence of missing values in some of the variables necessary for the study, the final sample consists of 4,300 observations of which there is information about the use of Internet banking, as well as economic and demographic characteristics of the individuals, specifically of the person cited who is considered the head of the family. In addition, when considering the variables of banking operations and means of payment, the sample is reduced to 3,905 observations.

A final question refers to the existence of different databases referring to the same survey. This is due to the allocation of values or imputations made by the Bank of Spain itself, in cases in which individuals do not respond to certain issues[3]. Finally, note that among the most recent studies based on this survey are Bover (2015), Sánchez-Martínez et al. (2016), Barceló and Villanueva (2016); Amuedo-Dorantes and Borra (2017); Pinilla et al. (2017). None of them, nor the previous ones, has analyzed the use of Internet banking.

4.4.2. Variables

According to the hypotheses, the dependent variable is the use of Internet banking, while explanatory variables include educational level, economic and demographic variables, as well as means of payment and banking operations.

Internet banking. The use of Internet banking is collected through a dichotomous variable that adopts the value one if the respondent affirms that he does use Internet banking and zero if he does not use it.

[3] From the five available imputations, number 1 has been used in the present work (see Bover et al. (2018).

Education level. The level of studies refers to the highest level reached and is collected through four dichotomous variables, in order of increasing training. Thus, the variable ***Ili_or_PriS*** adopts the value 1 if the reference individual is illiterate or has only primary studies and zero otherwise. The variable ***Sec_S*** adopts the value 1 if its highest level of training is that of secondary studies (E.S.O.) and zero otherwise. The variable ***Bacca*** adopts the value 1 if he has completed the baccalaureate degree or an equivalent degree in professional training (second degree) and zero otherwise. Finally, the variable ***Hight_S*** adopts the value 1 if he or she has finished university studies, either in degree or master.

Family income (***Income***). The level of income or family income is a continuous variable provided by the database, although it has been created by the Bank of Spain adding the items that represent different income concepts, whether from work, family businesses, investments, etc. This variable is introduced in the models in the form of a logarithm.

Demographics variables. The ***Age*** of the reference person is a continuous variable, although it is introduced in the models in logarithmic form. ***Sex*** is collected through the variable Man who adopts the value 1 if it is a male and 0 if it is a woman. The civil status. is collected through the ***Married*** variable, which takes the value 1 if the reference person is married or has a de facto partner, and 0 in any other state (separated, divorced, widowed, etc.).

*Business***.** Under the presumption that holding a business requires the completion of numerous banking operations, the variable that adopts the value 1 if the family has a business, regardless of whether it has total or partial ownership, and 0 in opposite case[4].

Payment methods. In order to consider whether the choice of different means of payment affects the use of Internet banking, representative variables of cash payments (ATMs), use of credit and debit cards have been included. The variable Cards refers to the number of payments that are made on average monthly with credit or debit cards. ATMs indicate the number of times a week that on average money is withdrawn from ATMs, (all family members).

[4] Strictly one should consider if one is an independent employer, but the question of the EFF relative to the legal form of the business is answered by a noticeably smaller number of individuals. In any case, the results are similar for models that include this variable or not (results not reported).

Bank operations. In order to consider different banking operations, 4 dichotomous variables have been included. 1) ***Banc_Ac_Inc*** adopts the value 1 if any member of the family receives regular income in the form of transfers or direct debits (e.g., payroll, pensions, rent, etc.) and zero if they do not receive any income in this way; 2) ***Payment_Dom*** adopts the value 1 if regular payments are made through direct debit and 0 otherwise and 3) ***Fre_Transf_emi***, adopts the value 1 if transfers are made frequently and 0 if they are made sporadically or are not made and 4***) Credit_Line*** is equal to 1 if you maintain a line or credit account with a bank which you can have according to your needs with an established limit and 0 otherwise.

4.5. RESULTS

4.5.1. Descriptive analysis

As indicated above, this analysis is taken from two samples. The first is made up of 4,300 individuals who have answered the question regarding the use of Internet banking, of which their income and demographic characteristics (age, sex and marital status) are also known. Of this sample, 63% are users of Internet banking. The second by 3,905 individuals who know their financial habits and banking operations (use of cards and ATMs, direct debits, transfers, etc.).

Table 4.2 shows the mean values (percentage in dichotomous variables) of the variables, as well as the mean difference test, for each of the aforementioned samples. As can be seen in Table 2, there are significant differences in all variables (except Bacca), among the group of users and non-users of the Internet banking. Based on this information, a certain profile of the Internet banking user in Spain can be elaborated. Thus, they are married men, somewhat younger than non-users and mostly with higher education. Regarding the level of income, the difference between both groups is minimal. Finally, in relation to the means of payment, these are individuals with a certain preference for payment by card and who frequently make bank transfers.

Table 4.2. Differences between users and non-users of Internet banking

	All	Users	Non-users	Means dif.[a]
Ili_or_PriS	13,97	6,99	25,82	296,94***
Sec_S	15,22	11,30	21,88	87,36***
Bacca	27,30	27,87	26,32	1,20
Hight_S	42,49	53,82	25,95	318,20***
Income (log)	10,69	10,81	10,24	-21,42***
Business	27,13	31,48	19,75	70,07***
Age (log)	3,99	3,96	4,02	7,17***
Man	64,89	68,88	58,12	51,20***
Married	71,68	74,41	67,06	26,78***
Cards (nº)	14,99	17,89	9.15	70,07***
ATM (nº)	1,38	1,48	1,18	-5,31***
Credit_Line	5,33	6,37	3,23	16,96***
Bank_Ac_Inc	94.74	95,57	93,07	10,90***
Payment_dom	99.31	99,73	98,46	20,55***
Fre_Transf_emi	6,27	8,05	2,69	16,96***
Observations[b]	4.300	2.700	1.600	

[a] Chi2 for dichotomous variables and t-test for the rest.
[b] For the variables of means of payment, the sample of 3,905 observations was used.
Source: own elaboration

Table A4.1 of the Appendix contains the average values as well as the matrix of correlations between the variables. In this table it can be seen that there are no high correlations between the variables, which avoids the problem of multicollinearity when estimating econometric models.

4.5.2. Econometric analysis

Given the dichotomous nature of the dependent variable, a logistic regression model is proposed, which is estimated using a probit model, using the Stata14 statistical package. The coefficients of the variables obtained in the probit estimation should be interpreted in probabilistic and marginal terms, that is, as the variation of the probability of the dependent variable before a variation of each explanatory variable, keeping the rest of the variables constant. Therefore, instead of beta coefficients (linear regression), marginal effects are used.

The results of the models estimated to contrast the hypotheses presented are presented in Table 4.3. Models 1 and 2 are estimated for the sample of 4,300 individuals, model 1 contains only the educational, economic and demographic variables while model 2 also includes the interactions between these and the educational level. The results obtained from model 1 indicate that a higher educational level increases the probability of using Internet banking.

Table 4.3. Determinants of Internet banking in Spain (I)
D.V.: Internet banking dummie = 1 if use, 0 do not use

Model	**(1)**		**(2)**	
	M.E	*S.E.*	*M.E..*	*S.E.*
Ili_or_PS	Reference		Reference	
Sec_S	0,0889***	0,0257	-0,4434	0,4961
Bacca	0,2169***	0,0212	0,6319***	0,1582
Hight_S	0,3187***	0,0222	0,9808***	0,0264
Income (log)	0,1464***	0,1122	0,1851***	0,0322
Age (log)	-0,4087***	0,3199	-0,2850***	0,0864
Man	0,0678***	0,0173	0,0057	0,0435
Married	0,0229	0,0184	0,0300	0,0507
Business	0,0372**	0,0180	0,0359**	0,1818
IncomexSec_S			0,0697	0,4499
IncomexBacca			-0,0212	0,0387
IncomexHight_S			-0,0870***	0,3585
AgexSec_S			-0,0308	0,1143
AgexBacca			-0,1591	0,1055
AgexHight_S			-0,2173**	0,1013
ManxSec_S			0,0273	0,0458
ManxBacca			0,1019**	0,0484
ManxHight_S			0,0775	0,0507
MarriedlxSec_S			-0,0776	0,0700
MarriedxBacca			-0,0197	0,0592
MarriedxHight_S			-0,0052	0,0584
Observations	4.300		4.300	
R^2	0,1519		0,1595	

M.E. marginal effects (dy / dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: Own elaboration

Thus, income is directly related to the use of Internet banking. On the contrary, age is negative, which indicates that older individuals have a lower propensity to use Internet banking than younger people. Regarding sex, men seem more willing to use the services of Internet banking than women. Finally, civil status is not significant in explaining the use of Internet banking in Spain.

However, some of these relationships are altered when considering the interaction with the educational level. Thus, the results of model 2 indicate that, although individuals with a higher level of income are more likely to use Internet banking, this probability is reduced when individuals have a higher education. In the case of age, the educational level enhances the negative effect. Men only show a significant difference with women in the use of Internet banking when they have a higher level of schooling, not being relevant sex or marital status in the other educational levels.

Models 3 and 4 replicate models 1 and 2, respectively, including, in addition to the previous variables, the variables of banking operations or financial habits, which is why

they are estimated for the sample composed of 3,905 individuals. As can be seen in table 4.4 both in models 3 and 4, the results obtained with respect to the variables of educational level, such as income and demographic, coincide and has statistical significance with those commented in models 1 and 2.

Table 4.4. Determinants of Internet banking in Spain (II)
D.V.: Internet banking dummie = 1 if use, 0 do not use

Modelo	**(3)**		**(4)**	
	M.E.	*S.E.*	*M.E.*	*S.E.*
Ili_or_PS	Reference		Reference	
Sec_S	0,0653**	0,0266	-0,2212	0,6547
Bacca	0,1877***	0,0216	0,6841***	0,1482
Hight_S	0,2795***	0,0235	0,9756***	0,9756
Income (log)	0,0927***	0,0117	0,1272***	0,1272
Age (log)	-0,0377***	0,0330	-0,2095**	-0,2095
Man	0,0626**	0,0176	-0,0157	-0,0157
Married	0,0119	0,0187	0,0002	0,0002
Business	0,0568***	0,0183	0,0552***	0,0552
Cards	0,0019***	0,0019	0,0019***	0,0003
ATM	0,0127**	0,0127	0,0110**	0,0053
Bank_Ac_Income	0,1068***	0,1068	0,1076***	0,0385
Payment_Dom	0,2669**	0,2669	0,2317**	0,1145
Transf_bank_emi	0,1344***	0,1344	0,1366***	0,0293
Credit_Line	0,0905***	0,0905	0,0955***	0,0321
IncomexSec_S			0,0824*	0,0483
IncomexBacca			-0,0213	0,0411
IncomexHight_S			-0,0745**	0,0382
AgexSec_S			-0,1338	0,1192
AgexBacca			-0,2346**	0,1114
AgexHight_S			-0,2163**	0,1056
ManxSec_S			0,0501	0,0563
ManxBacca			0,1119**	0,0475
ManxHight_S			0,0893*	0,0511
MarriedlxSec_S			-0,0725	0,0751
MarriedxBacca			0,0439	0,0598
MarriedxHight_S			0,0177	0,0600
Nº Observations	3.905		3.905	
R^2	0,1454		0,1526	

M.E. marginal effects (dy / dx)
*, **, *** Significant at 10%, 5% and 1%, respectively

Source: Own elaboration

With respect to the variables related to means of payment, all are positive and significant in both models. This indicates that the individuals with whom they use the cards the most, as well as the ATMs, are more likely to use Internet banking. Regarding banking operations, the results indicate that if periodic income is received in the form of bank transfers or direct debits, as well as if payments are made through direct debit, and those that make frequent transfers, they are more likely to use Internet banking. Finally, the

results obtained from interaction between educational level and economic and demographic variables are also maintained in relation to models 1 and 2.

4.6. DISCUSSION OF RESULTS AND CONCLUSIONS

The results obtained allow us to conclude that the existing relationship between education and the use of Internet banking is positive, so that the higher the educational level, the more likely consumers will be to use it. This offers support to the arguments presented in relation to hypothesis H1. In addition, they are in line with those obtained by other studies at the international level. Thus, in the case of Italy (Corrocher, 2006), Brazil (Hernández and Mazzon, 2007), Poland (Polasik and Wisniewski, 2009) or Greece (Giordani et al., 2014).

Likewise, the results allow corroborating hypothesis H2, according to which a positive relationship is established between the level of income and the use of Internet banking. These results coincide with those obtained by Kolodinsky et al., (2004, United States), Akinci et al. (2004, Turkey), Chang (2005), Corrocher (2006, Italy), Hernández and Mazzon (2006, Brazil), Gan et al., 2006, New Zealand), Flavian, et al. (2006, Spanish speakers), Ono and Zavodny (2007), Goldfarb and Prince (2008), Driga (2014 Romania) Giordani et al. (2014, Greece).

However, when analysing the joint effect of the rent with the educational level, the positive relationship is only maintained for individuals with secondary education and ceases to be significant for baccalaureate. However, the most striking is the negative result found when crossing individuals with higher education with the level of income. One possible explanation is that individuals with a high income may have a level of financial investments or information needs about more sophisticated financial products, which justify a personal relationship with the Banks' employees, not being sufficient for the type of services offered online. The only study that has found a negative relationship between income and Internet banking is that of Santouridis and Kyritsi (2014) referring to Greece, probably due to the fact that the higher the amount and the more complex the operations, the more comfortable people are with a face-to-face situation. So, the H3 is rejected.

The positive relationship between having a business and the use of Internet banking presumably derives from the need for this group to consult operations at the corporate level and its transfer to the personal sphere. This allows corroborating, H4 hypothesis.

These results coincide with those obtained by Lawson and Todd (2003) and Giordani et al. (2014) which suggest that the existence of this relationship is due to the time limitations of this group and that they are familiar with these tools to access their banking information.

Regarding the age and use of Internet banking, the negative relationship confirms a lower propensity to use it by older people, which allows us to corroborate hypothesis H5. The results obtained coincide with the studies by Polatoglu and Ekin (2001), Rice and Katz (2003), Akinci et al. (2004), Kolodinsky et al. (2004), Kim et al. (2005), Chang (2005), Flavian et al. (2006), Hernández and Mazzon (2007), McKeown et al. (2007), Goldfarb and Prince (2008), Hanafizadeh et al. (2014) in its study on the adoption of Internet banking worldwide, Giordani et al. (2014), which indicated that younger customers are more likely to adopt Internet banking than older customers. When the interaction between age and educational level is analyzed, the negative relationship is maintained when individuals have a baccalaureate or higher education, not being significant at lower educational levels. Therefore, H5 is accepted, and H6 is partially accepted.

In terms of gender, hypothesis H7 is corroborated, since there is a positive relationship between the fact of being a man and being a user of Internet banking. These results are in line with those found in previous studies such as Bimber (2000), Karjaluoto (2002), Lawson and Todd (2003), Akinci et al. (2004), Kolodinsky et al. (2004), Kim et al. (2005), McKeown et al. (2007), Polasik and Wisniewski (2009). These results have been associated with lower use of the internet by women. Authors such as Bimber (2000) attribute lower use of the Internet in the female gender for historical reasons such as the salary gap and the lower level of education. In any case, Lera-López et al (2011) maintain that the differences between genders are gradually being diluted due to the improvement in the generalized level of studies and greater equality between the sexes.

However, when interacting educational level with the fact of being a man, the relationship between being a man and being a user of Internet banking is only significant for the baccalaureate, this suggests to accept partially the H8 hypothesis. These results do not coincide totally with previous studies such as that of Hernández and Mazzon (2007) who found that young men with higher education and higher incomes were more inclined to use Internet banking.

Regarding marital status, the absence of statistical significance of this variable, indicates that we must reject H9 and H10 hypothesis. These results coincide with those found by Lee-Kelley et al. (2003). Therefore, they do not support the arguments of Sohail and Shanmugham (2003) which affirm that married clients are more prone to use Internet banking since they usually require more complex transactions.

Regarding means of payment, a greater use of credit cards is related to a greater use of Internet banking, which allows us to accept the H11 hypothesis. This coincides with the results of Gensler et al. (2012) in their study conducted in Europe on the benefits and costs of Internet banking, in which they show that customers who use credit cards or checks use Internet banking more. In the same way, there is also a positive and significant relationship between the use of ATMs and the use of Internet banking, therefore, we reject the H12 hypothesis, which suggested otherwise. However, the study by Akinci et al. (2004), indicated that the majority of non-users of Internet banking preferred the use of ATMs.

Finally, we confirm the existence of a positive and significant relationship between the greater frequency of use of banking operations and greater propensity to use Internet banking, corroborating the H13 hypothesis. In this sense, Estrella-Ramón et al. (2016) in the study carried out in Spain on the influence of consumers' offline behaviour on their online behaviour, found a close relationship between the user's offline behaviour with a greater frequency of operations and a faster adoption of Internet banking.

Table 4.4 presents a synthesis of the results obtained, in relation to each of the hypotheses.

According to the conclusions drawn, Spanish financial institutions interested in referring their customers to Internet banking should target young men with higher education, business owners, who use ATMs and credit cards and are used to contracting different banking products. However, individuals with higher education and higher income levels should be offered a more personalized service. It is hoped that this study is interesting for financial institutions to identify the customer segments that may be most beneficial to them.

Table 4.5. Synthesis of results

Nº	Hypothesis	Predicted relationship	Relationship obtained	Acceptance or rejection
H1	Individuals with higher education are more likely to use Internet banking than individuals with lower educational levels.	Positive	Positive	Accepted
H2	Individuals with a higher level of income are more likely to use Internet banking.	Positive	Positive	Accepted
H3	Individuals with a higher level of income and a higher educational level are more likely to use Internet banking.	Positive	Negative in higher education	Rejected
H4	Individuals who exercise a business activity are more likely to use Internet banking.	Positive	Positive	Accepted
H5	Younger clients are more likely to use Internet banking.	Negative	Negative	Accepted
H6	Younger and more educated clients are more likely to use Internet banking.	Negative	Negative	Partially accepted
H7	Men are more likely than women to use Internet banking.	Positive	Positive	Accepted
H8	Men with higher education are more likely than women to use Internet banking.	Positive	Positive only baccalaureate	Partially accepted
H9	Married individuals are more likely to use Internet banking.	Positive	N.S.	Rejected
H10	Married individuals with a higher educational level are more likely to use Internet banking.	Positive	N.S.	Rejected
H11	Greater use of credit cards is associated with greater use of Internet banking.	Positive	Positive	Accepted
H12	Greater use of ATMs reduces the use of Internet banking.	Negative	Positive	Rejected
H13	A greater frequency of banking operations increases the use of Internet banking.	Positive	Positive	Accepted

N.S: non significant

Source: own elaboration

REFERENCES

AEB (2007). Asociación Española de Banca. Statistical yearbook of the Spanish Bank Asociation.

AEB (2016). Asociación Española de Banca. Statistical yearbook of the Spanish Bank Asociation.

Akinci, S., Aksoy, Ş., and Atilgan, E. (2004). Adoption of internet banking among sophisticated consumer segments in an advanced developing country. *International journal of bank marketing*, 22(3), 212-232.

Aldás-Manzano, J., Lassala-Navarré, C., Ruiz-Mafé, C., and Sanz-Blas, S. (2009). The role of consumer innovativeness and perceived risk in online banking usage. *International Journal of Bank Marketing*, 27(1), 53-75.

Amuedo-Dorantes, C. and Borra, C. (2017). Emerging wealth disparities after the storm: Evidence from Spain. *Review of Economics of the Household*, 1-31.

Bimber, B. (2000). Measuring the gender gap on the Internet. *Social science quarterly*, 868-876.

Boateng, H., Adam, D. R., Okoe, A. F. and Anning-Dorson, T. (2016). Assessing the determinants of internet banking adoption intentions: A social cognitive theory perspective. *Computers in Human Behavior*, 65, 468-478.

Barceló, C. and Villanueva, E. (2016). The response of household wealth to the risk of job loss: Evidence from differences in severance payments. *Labour Economics*, 39, 35-54.

Bover, O. (2015). Measuring expectations from household surveys: new results on subjective probabilities of future house prices. Banco de España, Documentos de trabajo, 1535, 361-405.

Bover, O.; Crespo, L.; Gento, E. and Moreno, I. (2018). The Spanish survey of household finances (EFF): description and methods of the 2014 wave, Banco de España. Documentos ocasionales, 1804.

Chang, Y. T. (2003). Dynamics of banking technology adoption: An application to Internet banking. *Warwick Economic Research Papers*.

Chiou, J. S. and Shen, C. C. (2012). The antecedents of online financial service adoption: the impact of physical banking services on Internet banking acceptance. *Behaviour & Information Technology*, 31(9), 859-871.

Chong, A.Y.-L. Ooi, K.-B., Lin, B. and Tan, B.-I. (2010). Online banking adoption: An empirical analysis. *International Journal of Bank Marketing*, 28(4), 267-287.

Citrin, A.V., Sprott, D.E., Silverman, S.N. and Stem, D.E. (2000). Adoption of internet shopping: the role of consumer innovativeness, *Industrial Management & Data Systems*, 100(7), 294-300.

Corrocher, N. (2006). Internet adoption in Italian banks: An empirical investigation. *Research Policy*, 35(4), 533-544.

Davis, F. D., Bagozzi, R. P. and Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management science, 35(8), 982-1003.

Durkin, M., Jennings, D., Mulholland, G. and Worthington, S. (2008). Key influencers and inhibitors on adoption of the internet for banking. *Journal of Retailing and Consumer Services*, 15(5), 348-357.

Eriksson, K., Kerem, K. and Nilsson, D. (2005). Customer acceptance of internet banking in Estonia. *International journal of bank marketing*, 23(2), 200-216.

Estrella-Ramón, A.; Sánchez-Pérez, M. and Swinnen, G. (2016). How customers' offline experience affects the adoption of online banking. *Internet Research*, 26(5),1072-1092.

Flavián, C., Guinaliu, M. and Torres, E. (2006). How bricks-and-mortar attributes affect online banking adoption. *International Journal of Bank Marketing*, 24(6), 406-423.

Gan, C., Clemes, M., Limsombunchai, V. and Weng, A. (2006). A logit analysis of electronic banking in New Zealand. International Journal of Bank Marketing, 24(6), 360-383.

García, C. E. and Romero-Medina, A. (2004). La expansión de la banca online en España. Revista de economía. Información Comercial Española, 813, 89-100.

Gensler, S., Leeflang, P. and Skiera, B. (2012). Impact of online channel use on customer revenues and costs to serve: Considering product portfolios and self-selection. *International Journal of Research in Marketing*, 29(2), 192-201.

Giordani, G., Floros, C. and Judge, G. (2014). Econometric investigation of internet banking adoption in Greece. *Journal of Economic Studies*, 41(4), 586-600.

Goldfarb, A. and Prince, J. (2008). Internet adoption and usage patterns are different: Implications for the digital divide. *Information Economics and Policy*, 20(1), 2-15.

Hanafizadeh, P., Keating, B. W. and Khedmatgozar, H. R. (2014). A systematic review of Internet banking adoption. *Telematics and informatics*, 31(3), 492-510.

Hernandez, J.M.C. and Mazzon, J.A. (2007). Adoption of internet banking: proposition and implementation of an integrated methodology approach. *International Journal of Bank Marketing*, 25(2),72-88.

Hernández-Murillo, R., Llobet, G. and Fuentes, R. (2010). Strategic online banking adoption. *Journal of Banking & Finance*, 34(7), 1650-1663.

Hoehle, H., Scornavacca, E. and Huff, S. (2012). Three decades of research on consumer adoption and utilization of electronic banking channels: A literature analysis. *Decision Support Systems*, 54(1), 122-132.

INE (2017). Encuesta sobre Equipamiento y Uso de Tecnologías de Información y Comunicación en los hogares 2017.

Internet World Stats (2017). Usage and Population Statistics. Disponible en: https://www.internetworldstats.com/stats.htm

Karjaluoto, H., Mattila, M. and Pento, T. (2002). Factors underlying attitude formation towards online banking in Finland. *International journal of bank marketing*, 20(6), 261-272.

Kim, B.M., Widdows, R. and Yilmazer, T. (2005), The Determinants of Consumers' Adoption of Internet Banking, unpublished paper, Purdue University, West Lafayette, IN.

Kolodinsky, J. M., Hogarth, J. M. and Hilgert, M. A. (2004). The adoption of electronic banking technologies by US consumers. *International Journal of Bank Marketing*, 22(4), 238-259.

Lassala N., C. Mafé, C. R. and Blas, S. S. (2010). Implicaciones de la satisfacción, confianza y lealtad en el uso de los servicios bancarios online. Un análisis aplicado al mercado español. *European Journal of Management and Business Economics*, 19(1), 27.

Lassar, W. M., Manolis, C. and Lassar, S. S. (2005). The relationship between consumer innovativeness, personal characteristics, and online banking adoption. *International Journal of Bank Marketing*, 23(2), 176-199.

Lawson, R. and Todd, S. (2003). Consumer preferences for payment methods: a segmentation analysis. *International Journal of Bank Marketing*, 21(2), 72-79.

Lee-Kelley, L., Gilbert, D. and Mannicom, R. (2003). How e-CRM can enhance customer loyalty. *Marketing Intelligence & Planning*, 21(4), 239-248.

Lera-López, F., Billon, M. and Gil, M. (2011). Determinants of Internet use in Spain. *Economics of Innovation and New Technology*, 20(2), 127-152.

Mansumitrchai, S. and Chiu, C. (2012). Adoptation of internet banking in UAE: Factors underlying adoption characteristics. *International Journal of Management and Marketing Research*, 5(1). 103-115.

Martins, C., Oliveira, T. and Popovič, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management*, 34(1), 1-13.

Mattila, M., Karjaluoto, H. and Pento, T. (2003). Internet banking adoption among mature customers: early majority or laggards? *Journal of services marketing*, 17(5), 514-528.

McKeown, L., Noce, A. and Czerny, P. (2007). Factors associated with Internet use: Does rurality matter? Statistics Canada, Agriculture Division.

Montazemi, A. R. and Qahri-Saremi, H. (2015). Factors affecting adoption of online banking: A meta-analytic structural equation modeling study. *Information & Management*, 52(2), 210-226.

Ono, H. and Zavodny, M. (2007). Digital inequality: A five country comparison using microdata. *Social Science Research*, 36(3), 1135-1155.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H. and Pahnila, S. (2004). Consumer acceptance of online banking: an extension of the technology acceptance model. *Internet research*, 14(3), 224-235.

Pinilla, J., G.; López-Valcárcel, B. and Urbanos-Garrido, R.M. (2017). Estimating direct effects of parental occupation on Spaniards' health by birth cohort. *BMC Public Health*, 17:26.

Polasik, M. and Piotr Wisniewski, T. (2009). Empirical analysis of internet banking adoption in Poland. *International Journal of bank marketing*, 27(1), 32-52.

Polatoglu, V.N. and Ekin, S. (2001). An empirical investigation of the Turkish consumers' acceptance of Internet banking services. *International journal of bank marketing*, 19(4), 156-165.

Rice, R. E. and Katz, J. E. (2003). Comparing internet and mobile phone usage: digital divides of usage, adoption, and dropouts. *Telecommunications Policy*, 27(8-9), 597-623.

Rogers, E.M. (2003). Diffusion of Innovations, 5th ed., Free Press, New York, NY.

Sánchez-Martínez, M.T.; Sanchez-Campillo, J.; Moreno-Herrero, D. (2016). Mortgage debt and household vulnerability: Evidence from Spain before and during the global financial crisis", International Journal of Housing Markets and Analysis, 9(3),400-420.

Santouridis, I. and Kyritsi, M. (2014). Investigating the determinants of Internet banking adoption in Greece. *Procedia Economics and Finance*, 9, 501-510.

Sohail, M. S. and Shanmugham, B. (2003). E-banking and customer preferences in Malaysia: An empirical investigation. *Information sciences*, 150(3-4), 207-217.

Sullivan, R. J. (2000). How has the adoption of Internet banking affected performance and risk in banks? Federal Reserve Bank of Kansas City. *Financial Industry Perspectives*, 1-16.

Tunay, K. B., Tunay, N. and Akhisar, İ. (2015). Interaction between Internet banking and bank performance: The case of Europe. *Procedia-Social and Behavioral Sciences*, 195, 363-368.

Vrechopoulos, A. P., Siomkos, G. J. and Doukidis, G. I. (2001). Internet shopping adoption by Greek consumers. *European Journal of Innovation Management*, 4(3), 142-153.

Wang, Y. S., Wang, Y. M., Lin, H. H. and Tang, T. I. (2003). Determinants of user acceptance of Internet banking: an empirical study. *International journal of service industry management*, 14(5), 501-519.

APPENDIX 4.1. AVERAGE VALUES Y CORRELATION MATRIX

Table A4.1. Average values (percentages in dummies variables) and correlation matrix

	Online Banking	Sec_S	Bacca	Hight_S	Income	Age	Men	Married	Business	Cards	ATM	Bank_Ac_Income	Payme_dom	Frec_T
Media	62,92	15,22	27,30	43,50	10,60	3,99	64,89	71,68	27,13	14,99	1,38	94,74	99,31	6,27
Online_Bank	1													
Sec_S	-0,142***	1												
Bacca	0,016	-0,230***	1											
Hight_S	0,271***	-0,295***	-0,385***	1										
Income	0,310***	-0,160***	-0,013	0,484***	1									
Age	-0,108***	-0,166***	-0,140***	-0,006	0,040***	1								
Men	0,108***	-0,053***	0,014	0,144***	0,263***	0,074***	1							
Married	0,078***	-0,010	0,027**	0,096***	0,341***	-0,021*	0,302***	1						
Business	0,127***	-0,040***	0,042***	0,173***	0,320***	0,096***	0, 061***	0,158***	1					
Cards	0,1861***	-0,096***	-0,0223	0,1578***	0,2769***	-0,056***	0,0671***	0,0893	0,0639***	1				
ATM	0,0845***	-0,0364**	0,0431***	0,0089	0,0901***	-0,091***	0,0249	0,0535***	0,0592***	0,132***	1			
Bank_Ac_Inc.	0,0528***	-0,0590	-0,0590***	0,0594***	0,1022***	0,0674***	0,0195	0,0245***	-0,159***	0,057***	0,0398**	1		
Payment_Dom	0,0724***	-0,0037*	-0,0037	0,0584***	0,1186***	0,0627***	-0,0011	0,0526	0,0307**	0,044***	0,0233	0,0495***	1	
Frec_trans_B	0,1040***	-0,0389**	-0,0329**	0,0880***	0,1088***	-0,0297*	0,0300*	-0,0155***	0,0710***	0,085***	0,0857	-0,0050	0,0088	1
Credit_Line	0,0658***	-0,0282*	0,0082*	0,0199	0,0863***	0,0034	0,0190	0,0185	0,0924***	0,0286*	0,0286**	-0,0153	0,0198	0,0556***

*, **, *** Significant at 10%, 5% and 1%, respectively

Source: own elaboration

CONCLUSIONS

Within the framework of the literature on behavioral finance, the present doctoral thesis addresses several topics related to this area of research, not previously studied in depth by academics in Spain. Specifically, three studies have been carried out regarding FL, risk taking and Internet banking in Spain. There are few studies on the financial behavior of families in Spain and the published works have been elaborated mostly by researchers linked directly or indirectly to the Bank of Spain, the institution that develops the surveys used in this area, the Financial Survey of Families and more recently the Financial Competencies Survey.

Also, in the development of my professional career in banking for more than eleven years, I have had the opportunity to observe many times the reactions of customers to the offer of new products or services, as well as the limited or subconscious knowledge of basic financial concepts to make appropriate decisions. Likewise, with the Mifid regulation and its marked objective of increasing customer protection, banking professionals must know the risk profile of clients when offering the most suitable financial products for their investor profile, preventing them from contracting products with a degree of risk that they are not able to understand or tolerate. Finally, the consequences of the digitalization process of banking operations is another aspect that is changing the financial sector. This has motivated me to delve into the changes in order to further develop my understanding and be prepared for the digital transformation that the financial sector is undergoing.

From the analysis carried out, it is concluded that the FL level in Spain is acceptable and is around the average of the OECD countries, especially regarding the level of financial knowledge. In addition, respondents have demonstrated an adequate capacity to manage their personal finances, and an adequate attitude towards saving. The results of the present investigation reveal that the level of financial competences in Spain is reasonable, although there is still a large group of individuals that does not reach the minimum score to be considered competent in the managing of their personal / family finances. It should be noted that, in most of the previous studies, the international comparison is made using FL indicators based exclusively on financial knowledge. In this regard, the results obtained in the financial knowledge sub-index are consistent with those found in previous studies. In addition, when considering the different components of FL, certain differences are observed, which reveals the importance of distinguishing between the different aspects that define FL, being relevant when making comparisons at an international level.

Regarding financial risk tolerance, the results allow to conclude that the tolerance to risks by families in Spain is very low. Only 30% of the surveyed individuals with capacity to save show their favorable attitude to assume some risk contracting financial products. However, when analyzing the portfolio of financial investments, it can be seen that 45% of respondents have shares, this being the most risky product considered in this study. This has revealed the existence of a gap between the attitude towards risk and the actual assumption of risks, which is very relevant for the professionals involved in the commercialization of these products, as well as for financial advisors and the investors themselves. Among the groups most averse to risk are women, individuals with lower levels of education and with lower income levels, and married individuals.

With regard to the use of online banking in Spain, it has been observed that there is a capacity for it to be used by a greater number of users, more specifically among some specific groups. The results lead to the conclusion that women, older individuals, individuals with lower educational levels and with less income, who do not work on their own and who do not make great use of ATMs and do not perform many banking operations are less prone to the use of online banking. One of the conclusions that has drawn attention is that individuals with high income and a high educational level are not prone to the use of online banking, probably because they prefer personalized advice for the contracting of more complex financial products.

Regarding the explanatory factors of financial behavior, throughout the thesis the results obtained in each one of the studies have been presented in detail, and so to conclude the results are synthesized in a transversal way, making reference to the three studies simultaneously. This is possible, since the three studies have in common the attempt to explain the incidence of socio-demographic and economic factors in the aforementioned behavior. These factors are gender, educational level, age, marital status and income. Another aspect common to the three studies is that in all of them, a special reference is made to the moderating effect of the aforementioned variables in the relationship between gender and FL or between gender and risk tolerance, or in the relationship between educational level and the use of online banking. Hence, it is possible to draw some conclusions about the incidence of these variables in the different aspects of the behavior analyzed.

First, in the present thesis, based on the assumptions of social roles theory, special attention has been paid to gender. Thus, it has been found that women have a lower level of FL than men, although this effect is reduced among more highly educated women. However, it is also enhanced in married women. Likewise, women have a lower risk tolerance, although it is more consistent between their attitude or subjective propensity and their behavior when making financial investments. Finally, women have a lower propensity to use online banking.

Other relevant variables in the study are educational level and the level of income. In general, it has been observed that, as expected, a higher level of studies, as well as income, improves the FL level, as well as the propensity to assume financial risks and to use online banking. In terms of age, the results obtained in the three papers offer support to the life cycle theory of savings, which predicts that individuals have different financial behaviors at different stages of their lives. Finally, marital status, specifically being married or cohabiting improves the FL level, but it is reduced in the case of married women, as is the tolerance to risks, especially in women. Marital status is not relevant in the use of online banking.

Regarding the practical implications, it can be pointed out that institutions wishing to increase FL levels in Spain could focus on women with low levels of education and income, who are under 55 years of age and who do not cohabit, as groups more likely to maintain a low FL level and with a greater improvement path. Married women with lower incomes and lower levels of education would be the groups that would benefit the most from specific training in risk attitude. The increase in life expectancy, the uncertainty in the future of the pension system and the lower historical profitability offered by more conservative investment products could contribute to the advisability of assuming greater financial risks in the hope of obtaining higher future profitability. With the aim of trying to alleviate these inequalities between gender~~s and~~ among the various groups analyzed, specific training in this or the inclusion of Economics as a subject in the curriculum of compulsory secondary education could serve to balance the results shown by each group.

In the case of financial institutions, if they wish to address a segment of clients with a higher level of FL, they should focus on married men with higher education and high incomes, aged between 55 and 64 years old, since these individuals are more likely to understand more complex financial products and plan their finances in the long term.

In terms of risk tolerance, the results obtained have important implications for professionals in the financial sector, specifically banking advisors and employees. As indicated, the Mifid II regulations require professionals who market financial products to know the risk profile of their clients. In this sense, it is of vital importance for these professionals to take into account the possible discrepancy between the responses referring to the attitude towards risk and the actual investment decisions adopted. The results of the present study allow us not only to elaborate a profile of the investors in terms of their subjective attitude or their subjective predisposition to risk, but also to detect the characteristics that define the individuals with greater propensity to incur ~~in~~ the aforementioned gap. Specifically, men and individuals with higher education are more likely to incur the gap than women or individuals with lower levels of education. Therefore, it is suggested that financial professionals pay special attention to this type of client~~s~~ in order to avoid subsequent claims.

In terms of online banking, Spanish financial institutions interested in referring their clients to online banking should address young men with higher education, business owners, who use ATMs and credit cards and are used to contracting different banking products. However, individuals with higher educational levels and higher income levels should be offered a more personalized treatment. This study is expected to be interesting for financial institutions, allowing them to identify the customer segments that may be most profitable.

Finally, note that the main limitation of the study relates to the date of the data used, especially those referring to the Financial Survey of Families. One of the main problems encountered is the delay with which researchers are allowed to access to the databases of these surveys. Specifically, the last EFF corresponds to 2014 and access to the database was made available in November 2017, after the Bank of Spain's study service had already published its reports on it. These difficulties can be one of the causes of the practically null contribution of academic researchers in this field. Likewise, as an extension of the work, the study could be replicated for other periods in the case of the EFF, since there are those corresponding to previous years, although it is not easy to conduct panel studies due to the different composition of the sample in each wave. Regarding the ECF, used for the Financial Literacy chapter, it should be noted that this is the first edition of the aforementioned survey in Spain, so the results obtained are not comparable with previous

data, although they are comparable with the ones from other countries that have done these studies before.