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Three essays on family policy

Serafima Chirkova



Tesis

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# Three Essays on Family Policy

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Universitat d'Alacant  
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*to my grandmother Olimpiada*



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# Resumen

La notable disminución de las tasas de natalidad es una tendencia importante de la vida socio-económica en los países desarrollados de Europa en las últimas décadas, así como de los países post-comunistas y algunos países de Asia. Las razones que explican tal tendencia son varias. Mientras que en el caso de los países desarrollados las investigaciones concuerdan en señalar la gran influencia de los planes de carrera de las mujeres y, por lo tanto, el aplazamiento del primer nacimiento, la evidencia sobre la situación en los países en transición es mixta. Algunos investigadores explican el reciente descenso de la fecundidad como consecuencia de la disminución de la renta de las personas debido al shock de la transición económica. Otros afirman la importancia de la seguridad en el mercado laboral, la prestación de servicios de cuidado infantil, y el estado del sistema de salud.

Las consecuencias negativas de esas tendencias demográficas y la posible intervención del gobierno para estabilizar la situación han sido ampliamente discutidas en la literatura. El resultado de los movimientos políticos fue la creación y el desarrollo de las políticas favorables a la familia para mantener el equilibrio entre el trabajo y la vida familiar. Países como Alemania, Francia, Noruega y Suecia proclamaron explícitamente políticas a favor de la natalidad, mientras que otros, como EE.UU., Canadá, Suiza y los Países Bajos aplican un sistema de subsidios dirigidos a las familias con un recién nacido.

Las políticas familiares tienen un impacto importante en apoyo a la maternidad. Dichas políticas regulan las condiciones de trabajo de la madre, definen la elegibilidad para los beneficios sociales y proporcionan servicios de salud a la madre y el niño. En general, las políticas familiares tratan de aliviar las restricciones económicas y mantener el equilibrio entre trabajo y familia. Las preocupaciones pueden ser diferentes: la carga demográfica en el sistema de seguridad social, la discriminación laboral de las madres, el bienestar infantil, etc. Las relaciones entre los incentivos generados por estas políticas y el comportamiento de las mujeres depende en gran medida del tipo de políticas, las condiciones de elegibilidad, el monto de los beneficios y las oportunidades y limitaciones que enfrentan las familias.

Una familia toma la decisión de tener hijos y asigna el tiempo dedicado para el trabajo y el cuidado de los hijos bajo un determinado conjunto de restricciones. Algunas limitaciones de tiempo y de ingresos son moldeadas por el sistema de apoyo a la familia que establece la política del gobierno. Por lo tanto, las reformas en el sistema de políticas familiares potencialmente producen un impacto significativo en las decisiones del hogar a través de diversos canales, animando algunos tipos de estructuras familiares, proporcionando incentivos para la maternidad o para posponer el regreso de las madres al



trabajo. Dado el contexto institucional y dependiendo de los objetivos de la aplicación, las vías y eficacia de las políticas pueden variar de manera significativa.

Los diferentes tipos de políticas familiares implementadas potencialmente podrían estimular decisiones de maternidad, participación laboral de la mujer y cuidado de niños, ya sea directa o indirectamente. Sin embargo, la implementación de políticas podría tener un impacto ambiguo sobre los resultados conductuales si el sistema de apoyo a la familia carece de algunas instituciones. En mi tesis, proporciono evidencia empírica de la efectividad del sistema de apoyo a la familia, centrándome en la reforma del permiso parental en dos contextos institucionales diferentes: Rusia y Alemania. El objetivo común de los cambios introducidos fue estimular la fertilidad, pero la ejecución fue a través de diferentes canales, y la eficiencia de las medidas varía considerablemente entre estos países.

Empiezo mi análisis de la formulación de políticas familiares considerando el caso de Rusia. La situación demográfica de Rusia se caracteriza por las tendencias negativas de la población durante las últimas décadas. Centrándome en las decisiones de fertilidad para analizar las razones que subyacen a las bajas tasas de natalidad. En particular, investigo la reforma de la política familiar rusa de 2007, diseñada para apoyar la decisión de las mujeres a tener un segundo hijo y subsiguientes. La reforma se compuso de dos cambios principales en el sistema de apoyo familiar. Primero, introdujo el concepto de “capital de maternidad”. Las madres de segundo y siguientes hijos tienen derecho a un vale de 8.800 euros que la familia puede destinar a una serie de usos pre-especificados: la mejora de las condiciones de la vivienda, el pago de la educación del niño, o la contribución al régimen de pensiones de la madre. Segundo, las prestaciones de licencia parental aumentaron significativamente para las madres con órdenes de natalidad más altos. Para identificar el impacto de esta política pro-natalista sobre los incentivos de fertilidad, mi trabajo explota la heterogeneidad en los ingresos familiares y en las condiciones de la vivienda. Usando la Encuesta de Seguimiento Longitudinal de Rusia para el período 2001-2011, analizo el impacto de la reforma sobre la decisión de tener un segundo hijo. Para ello, estimo un modelo de elección binaria de la fertilidad explotando la variación en los incentivos financieros. Los resultados confirman que las reformas introducidas aumentaron la probabilidad de tener un segundo hijo para las mujeres empleadas. Además, el impacto del efecto depende del sexo del primogénito.

En los capítulos siguientes continúo el análisis de la política familiar estudiando los efectos de los cambios inducidos por la reforma de la licencia parental de 2007 en Alemania. Para superar las tendencias negativas en la fertilidad y la participación laboral de las madres, el gobierno alemán aumentó las prestaciones parentales y acortó el período de su disfrute. En el capítulo 2 de esta tesis, investigo los efectos de los cambios introducidos en las decisiones de fertilidad. Usando la variación en los incentivos financieros generados por la reforma, estimo un modelo de elección bivalente de la transición al primer y segundo nacimientos. El análisis se basa en el Panel Socioeconómico Alemán para el período de 2001 a 2010. Los resultados empíricos confirman el cambio significativo en el comportamiento reproductivo de las mujeres que trabajan a tiempo completo después de la implementación de la reforma. Las parejas sin hijos tienden a posponer su entrada en la maternidad, mientras que las madres con un hijo tienen mayor probabilidad de presentar un segundo nacimiento.

El capítulo 3 se centra en el impacto de la reforma sobre el retorno al trabajo y la crianza

de los hijos. Para identificar la respuesta conductual a los incentivos introducidos, estimo un modelo de elección bivalente de empleo de las madres y cuidado de los niños. Usando datos del Panel Socioeconómico Alemán para el período 2001-2010, los resultados empíricos muestran que la política tiene un efecto negativo significativo sobre las interrupciones en el empleo relacionadas con la maternidad. La probabilidad de retornar al trabajo durante los primeros dos años de maternidad se reduce, y el efecto persiste tanto para el primer como para el segundo año de crianza de los hijos. El impacto se amplifica para las madres con un empleo regular a tiempo parcial. Los resultados sugieren que los cambios en las prestaciones parentales han permitido a las madres compensar las pérdidas salariales del empleo a tiempo parcial y reasignar su tiempo en favor del cuidado del niño. El impacto directo de la reforma sobre el comportamiento de crianza de los hijos es insignificante. Ello me lleva a sostener que la madre sigue siendo el principal proveedor de cuidado a los niños debido a la disponibilidad limitada de las instituciones de cuidado infantil.

Siguiendo la estructura presentada anteriormente, a continuación proporciono un análisis detallado de la motivación y las principales conclusiones de mi tesis doctoral.

El capítulo 1 se centra en los cambios recientes en la política familiar en Rusia. La dinámica de la población de Rusia sigue el modelo de los países desarrollados que se enfrentan al problema de las bajas tasas de fertilidad. La tasa global de fecundidad de Rusia (TGF), definida por las Naciones Unidas, se encuentra por debajo del nivel de 2,1 nacimientos por mujer, como en la mayoría de los países desarrollados. La edad mediana al momento del parto en Rusia es de alrededor de 27 años, por debajo del nivel promedio para los países desarrollados (30 años). El aumento de la edad mediana de las madres rusas ha estado acompañado por el aplazamiento de la decisión de la fertilidad. Según la evaluación de las Naciones Unidas, la edad de las mujeres en el primer parto se ha desplazado de 23,8 en 2002 a 24,6 en 2009. Por lo tanto, la dinámica positiva en el comportamiento reproductivo, a partir de 2006, se caracteriza por el efecto del envejecimiento de las madres.

El rápido descenso de la fertilidad se inició a finales de los 1980s, cuando la economía rusa comenzó la transición hacia un sistema de mercado, y alcanzó su mínimo de 1,17 en 1999. Avdeev (2003) apunta que la transición a la maternidad fue postergada cada vez más como consecuencia de la profunda crisis económica durante la década de 1990. La otra consecuencia de la crisis económica fue el cambio del modelo reproductivo de “dos hijos” al de “un hijo”.

La persistencia de las tendencias negativas en la fertilidad durante la primera mitad de la década de 2000 (TFR alrededor de 1,3) inició la discusión a nivel gubernamental. En mayo de 2006, durante el discurso anual a la Asamblea Federal de Rusia, el Presidente se refirió a la importancia de los problemas de despoblación y la necesidad de estimular la fertilidad. El concepto de “capital de maternidad” se introdujo como una posible solución para apoyar la decisión de las mujeres a tener un segundo y siguientes hijos. El certificado de capital de maternidad es un bono de 8.800 euros-que la familia puede destinar a unos usos pre-especificados: la mejora de las condiciones de vivienda, el pago de la educación del niño, o la contribución al régimen de pensiones de la madre. El hecho de que los padres puedan utilizar el dinero sólo después del tercer cumpleaños del niño fue la condición. Por lo tanto, la reforma crea incentivos para tener hijos segundos o posteriores con un flujo garantizado de consumo en el futuro.

Otros cambios importantes introducidos se referían a las prestaciones de la licencia parental. Antes de 2007, el pago de la licencia parental era uniforme e independiente de la situación laboral de la madre o del orden de nacimiento del niño. Bajo el nuevo sistema, las prestaciones del permiso parental pasaron a ser del 40% de ingresos brutos mensuales del miembro de la pareja dedicado a la crianza del hijo. La ley determinó un pago mínimo, en función del orden de nacimiento, y un pago máximo. El beneficio mínimo para el segundo y los siguientes hijos se fijó en el doble que el pago mínimo por el primer hijo. La nueva legislación entró en vigor el 1 de enero de 2007. En suma, estas reformas en la política familiar se dirigieron principalmente a la estimulación económica directa de la decisión de las mujeres respecto a nacimientos de órdenes superiores.

Hay pocos estudios que analicen si la reciente dinámica positiva en las tasas de natalidad se puede atribuir a las reformas de 2007. Frejka y Zakharov (2012) indican que las tasas de fertilidad de segundo y superiores nacimientos fueron aumentando durante el período posterior a la reforma, mientras que la proporción de la transición a la maternidad disminuyó. Los autores subrayan que las reformas permiten a las mujeres completar sus planes de fertilidad pero no cambian preferencias de las madres respecto al número deseado de hijos. Zakharov (2012) confirma estas conclusiones, destacando que el actual aumento de las tasas de natalidad observado se debe a los cambios en el momento del segundo y siguientes nacimientos. Slonimczyk y Yurko (2012) estiman el efecto de la reforma sobre la fertilidad y la decisión de participación en el mercado laboral mediante un modelo dinámico estructural. Los resultados de las estimaciones no proporcionan ninguna evidencia de un efecto positivo significativo.

Siguiendo la literatura, en esta tesis me centro en el efecto de los incentivos financieros introducidos en la decisión de las mujeres de tener un segundo hijo. La reforma debería tener un impacto positivo en las decisiones de fertilidad de nacimientos superiores a través de diferentes canales. Primero, la reforma reduce las pérdidas de ingresos de los hogares durante el permiso parental. Segundo, el capital de maternidad se puede utilizar como un sistema de pagos futuros para aumentar la calidad de vida mediante la mejora de las condiciones del hogar, y/o para reducir los costos de la crianza de los niños, en aquellos casos en que se utilice el capital de maternidad para sufragar los gastos en educación. Por lo tanto, disminuye el precio marginal de la calidad del hijo. En general, el efecto esperado debería tener un impacto positivo en el segundo nacimiento (Milligan (2005), Neyer y Andersson (2008), Lalive y Zweimüller (2009)). Dadas las peculiares características de la política formulada, la respuesta puede variar entre las categorías de empleo y educación/ingresos. Además, el sexo del primer hijo y la edad al primer embarazo también pueden influir en la magnitud del efecto, lo cual compruebo empíricamente.

Usando la Encuesta de Seguimiento Longitudinal de Rusia para el período 2001-2011, analizo el impacto de la reforma sobre la decisión de la madre de tener un segundo hijo. Para ello, me concentro en parejas casadas, ya que la familia monoparental (cohabitante) se enfrenta a diferentes limitaciones financieras y a una mayor inseguridad laboral. Concretamente, estimo un modelo de elección bivalente de fertilidad explotando la variación en las características socio-económicas individuales y de los hogares.

Las conclusiones del capítulo 1 presentan nueva evidencia sobre los incentivos financieros y la fertilidad. Dicho capítulo demuestra que las reformas familiares de 2007 crearon una respuesta no lineal en las decisiones de fertilidad de diferentes grupos de mujeres.

Para el conjunto de la muestra, encuentro un impacto positivo pero insignificante en la decisión de tener un segundo hijo. Este resultado es compatible con las conclusiones de Slonimczyk y Yurko (2012). Sin embargo, la reforma tiene un impacto significativo para una categoría específica: las mujeres ocupadas. La probabilidad del segundo nacimiento se incrementó después de la implementación de la reforma. Estos descubrimientos confirman los resultados empíricos existentes en la literatura sobre permisos parentales y beneficios infantiles (Milligan (2005), Neyer y Andersson (2008), Lalive y Zweimüller (2009)). El efecto se debe principalmente al grupo de las mujeres con bajo nivel de educación, que posiblemente corresponden a grupos de bajos ingresos. Además, hay una respuesta heterogénea en función del sexo del primer hijo: las madres con una niña tienen una mayor probabilidad de tener un segundo hijo después de la introducción de la reforma. La posible interpretación de este resultado es un sesgo de género en las preferencias de la madre de las parejas rusas hacia los hijos varones. Por lo tanto, la reforma podría estimular a los padres en sus intenciones de tener un niño aliviando las limitaciones económicas. Estos resultados son nuevos en el contexto de la investigación existente sobre las preferencias de género infantil en los países europeos (véase Anderson *et al.* (2006)). La reforma no tiene un impacto adicional para las familias con condiciones de vivienda restringidas, aunque las condiciones de vivienda siguen siendo un factor importante en la determinación de la decisión de fertilidad.

En general, los resultados sugieren que la reforma tiene un impacto positivo sobre la decisión de la fertilidad. La magnitud de los resultados debería interpretarse con precaución debido a un posible sesgo de selección. Otra limitación importante es que no es posible distinguir los efectos del capital de maternidad y de los cambios en la asignación de la licencia parental sobre el comportamiento reproductivo.

En los capítulos siguientes continúo el análisis de las políticas familiares en un contexto institucional alternativo, centrándome en el caso de Alemania. La dinámica de la población alemana sigue el modelo de los países desarrollados que enfrentan el problema de la baja tasa de natalidad. Mientras que Francia, Noruega y Suecia cuentan con dinámicas de nacimiento positivas, alcanzando niveles reproductivos, las tasas de natalidad alemanas son consistentemente bajas (1,3 nacimientos por mujer), con la misma edad media en el momento del nacimiento del niño de alrededor de 30 años. En el caso de Alemania, la edad media coincide con una edad al primer parto; en 2008, la edad media de una mujer al momento del primer parto fue de alrededor de 30 años.

El estancamiento de la dinámica reproductiva parece sorprendente en un país con un generoso sistema de apoyo pro-natalista. Según un estudio realizado por el Instituto de Kiel, el gobierno alemán financia más de un tercio de los costos de los hijos. En 2004, los gastos en prestaciones familiares e infantiles ascendieron en Alemania al 10,5% del total de los gastos sociales, cifra superior a la media de 7,8% de la UE. Por lo tanto, el actual sistema de apoyo familiar alemán se podría definir como generoso y costoso. Al mismo tiempo, Alemania se caracteriza por sus bajas tasas de fecundidad y de actividad laboral maternal.

La relativamente baja tasa de participación laboral de las madres con niños pequeños es una característica peculiar del mercado de trabajo femenino alemán. En el período previo a la reforma, la tasa de participación laboral maternal fue de menos del 50%, mientras que la tasa media europea fue de cerca del 57% para las madres con hijos

menores de seis años de edad. Entre las madres que trabajan, el porcentaje de trabajadoras a tiempo parcial fue del 66%, lo cual es significativamente más alto que el nivel europeo promedio de 47%. Esta preocupación se convirtió en uno de los objetivos de la reforma de política familiar en 2006. El gobierno decidió aumentar el subsidio y reducir el plazo de pago a fin de crear incentivos financieros para el retorno al trabajo. En el período posterior a la reforma, el crecimiento del empleo materno mejoró en alrededor del 13%. El cambio fue acompañado por un aumento de un 5% en el empleo a tiempo parcial. Estas cifras sugieren que la reforma tuvo éxito en fomentar el empleo post-maternal en el corto plazo.

Las soluciones para el cuidado de niños son un factor importante para la decisión de empleo de las mujeres, ya que constituyen un sustituto para el tiempo de cuidado de la madre. Los sistemas de cuidado infantil se diferencian naturalmente entre los países europeos en función de la forma de provisión y financiación. Sin embargo, el cuidado de niños formal (como centros diarios de cuidado infantil y niñeras registradas) sigue siendo la fuente principal de provisión. Un estudio de corte transversal de países europeos en 2008 reporta una correlación positiva entre la proporción de niños que reciben cuidado externo y el empleo materno. Alemania se caracteriza por un nivel claramente bajo de provisión de cuidado infantil, alcanzando un 17,8% frente al promedio europeo de 37%. Las estadísticas confirman la escasez de servicios de cuidado infantil formales para las madres con hijos menores de tres años. Los arreglos informales pueden compensar la falta de institutos formales como sustituto de la atención materna, pero su nivel es relativamente bajo en el caso de Alemania. En 2008, los arreglos informales fueron del 14,5% en comparación con la media de la UE 23,7%. Por lo tanto, la disponibilidad de los servicios de guardería es un factor importante para la consideración política.

Para superar las tendencias negativas en la fertilidad y el empleo de la madre, en 2006, el gobierno alemán anunció la reforma del sistema de permiso parental. Los objetivos eran aumentar las tasas de fecundidad y el empleo materno. Como se discute en Spiess y Wrohlich (2008), la idea principal de las reformas de 2007 era proporcionar un apoyo institucional para el empleo materno cambiando el sistema existente hacia el modelo escandinavo de “hogares de doble ingreso”. Existía la creencia en el debate político alemán de que el modelo escandinavo (con una alta provisión de cuidado de niños financiado con fondos públicos y permisos de paternidad generosa) promueve mayores tasas de fertilidad y empleo entre las madres con niños pequeños, reduciendo las pérdidas de ingresos familiares después del parto. El nuevo sistema se estableció a finales de 2006 y comenzó a ser aplicable para los niños nacidos después del 1 de enero del 2007. Según la discusión pública de la reforma, la misma apuntó a estimular la fertilidad mediante la compensación de la disminución de ingresos en el primer año de maternidad, a apoyar a la madre en la vuelta al trabajo y a aumentar la participación de los padres en el cuidado de niños.

Los principales cambios de la reforma están relacionados con la duración y el monto de la prestación durante el permiso parental. La reforma elevó sustancialmente el monto de las prestaciones de permiso parental y acortó el período de pago. Bajo el nuevo sistema, las prestaciones condicionales se sustituyeron por el subsidio para los padres, que es del 67% de los ingresos netos laborales mensuales. Otro cambio importante se refiere a la duración máxima del período de disfrute de la prestación. Se concede el

subsidio parental durante 14 meses de duración conjunta, lo que significa que ambos padres comparten el período de crianza de los hijos, y sólo durante 12 meses en el caso de un solo cuidador, en lugar de 24 meses. En resumen, el nuevo sistema de permiso parental se hizo más generoso, pero para un período de tiempo más corto.

Hay una serie de estudios que discuten los efectos de varios cambios históricos en la política familiar alemana sobre la fertilidad y el trabajo. Buttner y Lutz (1990) consideran la introducción de licencias pagadas hasta el primer cumpleaños del niño para una madre trabajadora con dos o más niños en la República Democrática Alemana durante la década de 1970. Los autores encuentran un efecto positivo significativo en el segundo y tercer nacimiento que permanece en el largo plazo. Ondrich *et al.* (2003) indican que la liberalización del sistema de licencias de maternidad en la década de 1990 disminuyó la probabilidad de volver a trabajar. Usando datos sobre salarios para 1975-2001, Ejrnaes and Kunze (2012) encuentran un efecto de selección negativa para las mujeres que vuelven al trabajo a tiempo completo después del primer nacimiento. En particular, las madres que deciden volver a su puesto de trabajo son las que sufren pérdidas salariales relativamente más altas durante las interrupciones debidas al nacimiento. Hofmann y Hohmeyer (2013) indican que la incertidumbre económica en el comienzo de la década de 2000 crea un efecto de retraso en la fertilidad en las parejas alemanas. Haan y Wrohlich (2011) introducen un modelo estructural del empleo femenino y la fertilidad para estimar el efecto de los incentivos financieros. La calibración del modelo se basa en los datos del Panel Socioeconómico Alemán para el período 2000-2006. Sus resultados confirman que los incentivos financieros relacionados con el empleo de las mujeres trabajadoras crean pequeños cambios en los incentivos a la fertilidad. Por el contrario, los incentivos financieros relacionados con los niños producen un efecto positivo y significativo sobre la fertilidad. Además, las mujeres que no tienen hijos presentan una mayor probabilidad de dar a luz.

Pocos estudios analizan la reforma de los permisos parentales de 2007 y su impacto en el empleo materno. Para estimar los efectos de la reforma, Kluge y Tamm (2009) y Bergemann y Riphahn (2011) utilizan un enfoque de “experimento natural”, suponiendo que la introducción de la reforma no fue anticipada por un grupo de la población. Utilizando datos de encuestas recopilados por los fondos de seguro de salud en dos estados federativos, Kluge y Tamm (2009) encuentran una disminución significativa en la probabilidad de empleo durante los primeros 12 meses de la maternidad. Los resultados difieren de la situación en el empleo esperado en el segundo año de la maternidad, donde aumenta la probabilidad de participación laboral. Aplicando la misma estrategia de identificación a datos provenientes de otro panel de hogares alemanes, Bergemann y Riphahn (2011) muestran el efecto positivo de la reforma del permiso parental alemán sobre la intención de las madres a volver al trabajo. Geyer *et al.* (2012) comparan los enfoques estructural y experimental, usando los datos del micro-censo alemán para analizar los efectos sobre el empleo. Como en los estudios anteriores, los autores encuentran una disminución significativa en el empleo a tiempo parcial materno durante el primer año. Los cambios globales en la participación durante el segundo año de la maternidad son insignificantes.

En estudios recientes se ha evaluado el papel de los servicios de cuidado infantil en Alemania para el empleo materno. Muehler (2010) compara al sector público con los proveedores no públicos. Destaca la falta de espacios de jornada completa para los

niños menores de tres años y la variación regional significativa en el acceso a servicios de cuidado infantil. Utilizando micro-simulaciones, Haan y Wrohlich (2011) concluyen que los subsidios de cuidado infantil condicionados a la situación laboral materna aumentan la oferta de trabajo. El análisis de políticas contrafactual de Bick (2011) muestra que los subsidios insuficientes para el cuidado infantil disminuyen la participación laboral de las madres con hijos menores de tres años. Schober (2012) se centra en la distribución del tiempo de cuidado infantil dentro de la pareja. Encuentra que la reforma permiso parental 2007 aumentó la participación de los padres en el cuidado infantil.

Siguiendo la literatura, en esta tesis me centro en la evidencia empírica de los efectos de los cambios en las políticas familiares para la fertilidad y las decisiones de empleo materno bajo la provisión de cuidado infantil restringida. Primero, en el capítulo 2, pruebo que los incentivos introducidos tienen un impacto sobre las intenciones de fertilidad de las mujeres alemanas.

Basándome en los resultados discutidos previamente, concentro la atención en las respuestas heterogéneas de las mujeres en los distintos grupos de paridad. Para las parejas sin hijos espero una respuesta no significativa a los incentivos introducidos. La reforma podría tener un impacto positivo que permite completar la fertilidad para las parejas con un hijo. El grupo de interés lo constituyen las mujeres que estaban empleadas durante la decisión de la concepción, porque la reforma del permiso parental produce una mayor variabilidad en los incentivos financieros de las trabajadoras. Para estimar el efecto de la reforma, utilizo los datos del Panel Socioeconómico Alemán para el período 2001-2010, explotando la variación en las características individuales y familiares. Hallazgos recientes sugieren que, en Alemania, la falta de acceso a los centros de cuidado infantil deprime la fertilidad. Para tener en cuenta la disponibilidad de cuidado infantil, utilizo datos regionales sobre los servicios públicos de cuidado infantil.

Los resultados empíricos indican un cambio significativo en los planes de nacimiento asociado con una implementación de la reforma. Entre las parejas sin hijos, la probabilidad de entrar en la maternidad ha disminuido, mientras para las parejas con un hijo tienen más probabilidades de tener un segundo. El efecto persiste sólo para las mujeres empleadas a tiempo completo. En el caso del segundo nacimiento, existe una ligera variación en función de la edad, siendo el efecto más acentuado para las cohortes más jóvenes. Los resultados de los efectos a corto plazo muestran que la reforma ha creado una respuesta multidireccional de las intenciones de fecundidad. En promedio, las mujeres que están actualmente empleados a jornada completa y en cohabitación tienden a posponer la entrada en la maternidad después de la implementación de la reforma. Al contrario, en las parejas con un niño las intenciones de tener un segundo hijo aumentan después de la aplicación de la reforma. El último resultado es consistente con la evidencia empírica de la reforma del permiso parental discutida en la literatura. Neyer y Andersson (2008), Ronsen (2004) y Lalive y Zweimüller (2009) encuentran un impacto significativo del aumento de la prestación por maternidad sobre los nacimientos de orden superior.

La asociación negativa entre la primera maternidad y la política implementada podría estar relacionada con una mayor incertidumbre para la mujer que se plantea entrar a la maternidad. Un suministro restringido de cuidado infantil puede crear un efecto de aplazamiento que no puede ser simplemente compensado por los beneficios monetarios.

La importancia de la disponibilidad de cuidado infantil proporciona evidencia empírica de que las mujeres anticipan los mayores costos de crianza de los hijos, confirmando el estudio realizado por Spiess y Wrohlich (2008). Su experimento de política sugiere que el aumento de los subsidios al cuidado de niños puede producir un efecto positivo en las decisiones de parto de las mujeres sin hijos.

En general, los resultados sugieren que los cambios introducidos en la política de permiso parental no han sido eficaces en la estimulación de las decisiones de fecundidad alemanas en el corto plazo. Por un lado, se permite a las mujeres a completar su plan de fertilidad, por otro lado parece disminuir la intención sobre la maternidad. Teniendo en cuenta las magnitudes, el impacto total para las tasas globales de natalidad es insignificante.

En el último capítulo, continúo el análisis de la reforma del permiso parental alemán. En dicho capítulo estudio si los cambios introducidos han conseguido uno de los objetivos previstos, incrementar el empleo materno. Dado que la reforma aumentó los recursos financieros y acortó los plazos de percepción en los primeros años de la maternidad, me concentro en la respuesta de las mujeres con hijos menores de tres años en términos de empleo y de utilización de servicios de guardería, dada la restricción en la disponibilidad de instituciones de cuidado infantil.

Según la teoría (Becker *et al.* (1960), Willis (1973), Joseph Hotz *et al.* (1997)) , un aumento de los incentivos financieros disminuye las pérdidas salariales maternas y pospone el regreso al trabajo durante el período de percepción. Del mismo modo, la reducción de la duración genera incentivos financieros para volver a trabajar cuando el período de pago termina. Por lo tanto, los resultados esperados de la reforma son menores tasas de participación de las mujeres con recién nacidos durante el primer año y tasas de participación más altas durante el segundo año. Dadas las características propias del mercado laboral alemán y el sistema de cuidado infantil, argumento que estos resultados no se aplican al caso alemán, en el cual las mujeres tienen un acceso restringido al sistema de cuidado infantil. En teoría, el impacto de los costos de cuidado infantil sobre la decisión de trabajo materna depende de dos factores. Por una parte, existe un canal salarial: precios más altos del cuidado infantil aumentan el salario de reserva materna y podrían disminuir la participación. El segundo canal es el acceso libre al mercado de cuidado infantil. Cuando la mayor parte del cuidado infantil es proporcionado por instituciones públicas y existe racionamiento, el precio oficial del cuidado infantil es relativamente bajo. Sin embargo, el precio efectivo es infinito para las familias que no tienen acceso a las plazas públicas. Dadas las limitaciones de disponibilidad de cuidado infantil público, los efectos de la reforma sobre la conducta de retorno al trabajo son ambiguos. Cabría esperar que los índices de retorno al trabajo disminuyan durante el primer año, que los efectos sean no significativos para el segundo año de la maternidad y una ausencia de efectos sobre las decisiones de inscripción en los servicios de cuidado infantil.

Para estimar los efectos de la política, propongo un modelo empírico de las decisiones maternas con respecto al trabajo y al cuidado infantil. Usando una encuesta panel de hogares alemanes para el período 2001-2010, calculo la probabilidad conjunta de participación en la fuerza laboral y el uso de servicios de cuidado infantil. La estrategia de identificación se basa en la variación en la duración del permiso parental y el subsidio inducido por la reforma, la variación de los ingresos laborales de la pareja y otras



características de los hogares como el estado civil y la educación de los cónyuges. Utilizo la variación regional en la matrícula de cuidado infantil para tener en cuenta los efectos de la disponibilidad de cuidado infantil en la decisión laboral.

El capítulo 3 proporciona una evidencia empírica detallada sobre la relación entre el empleo materno y el cuidado infantil. Al estimar la probabilidad conjunta de diversos servicios de guardería y diferentes regímenes de trabajo, observo una evidencia adicional sobre la importancia de las restricciones institucionales para la implementación de políticas. Teniendo en cuenta el régimen de cuidado infantil utilizado, encuentro que la reforma afecta a los resultados del trabajo materno en dos direcciones. Primero, el subsidio más alto disminuye las pérdidas de ingresos de las madres que estaban empleadas antes del parto. Por lo tanto, la probabilidad de volver al trabajo disminuye durante el primer año de la maternidad. Estos resultados son consistentes con la evidencia empírica anterior (véase Kluge y Tamm (2009), Bergemann y Riphahn (2011), Geyer *et al.* (2012)). Segundo, los cambios en la duración del permiso parental pagado no producen ningún efecto positivo significativo en la participación laboral de la madre durante el segundo año de la maternidad. Además, para las mujeres empleadas a tiempo parcial la probabilidad de trabajo disminuye después del nacimiento. Intuyo que este impacto negativo se relaciona con las características institucionales de la provisión de cuidado infantil en Alemania. Bick (2011) muestra que la baja cobertura de cuidado infantil pública, la ausencia de un mercado privado de cuidado de niños, junto con un bajo nivel de arreglos informales podría crear una barrera para la participación en el mercado laboral por parte de las madres. La evidencia empírica sobre la efectividad de la política alemana en el empleo materno es importante para el análisis futuro de políticas similares. Mis resultados sugieren que la aplicación de la reforma puede producir efectos ambiguos para el grupo objetivo en el corto plazo si no se toman en cuenta las limitaciones institucionales.

# Chapter 1

## Do pro-natalist policies reverse depopulation in Russia?

### 1.1 Introduction

Many countries in Western Europe, along with all post-communist and a few Asian countries, have reported low fertility rates for several decades now. There are various reasons behind these trends. While in the case of developed countries, common research agrees on the major influence of the female's career plans and, thus, delaying the first childbirth, the evidence is mixed regarding the situation in transition countries. Some researchers explain the recent drop in fertility as a consequence of the decline in personal income due to transition economic shocks. Others state the importance of labour market security, provision of child-care services, and condition of the health care system<sup>1</sup>.

Russian population dynamics follows the pattern of developed countries facing the problem of low fertility rates. Figure 1.1 shows that Russian total fertility rate (TFR) is below the reproductive level of 2.1 births per women (the United Nations definition) as in most developed countries. There are some specific child-rearing characteristics. In general, the Russian median age at childbirth is around 27 years old which is below the average of 30 years for developed countries. The increase in the median age of Russian mothers has been accompanied by the postponement of fertility decisions. According to the United Nations evaluation <sup>2</sup> the age of women at first childbirth has shifted from the 23,8 in 2002 to 24,6 in 2009. Therefore, the positive dynamics in reproductive behaviour, starting in 2006, is characterized by the advanced maternal age effect<sup>3</sup>.

Russian birth rates started to steadily decline at the end of 1950s. The decline was driven by the rural population migrating to urban areas and changes in behavioural pattern (Avdeev (2003)). At the end of 1960s, the Russian population became homogeneous on average in terms of the "one-or-two children" family model. At the

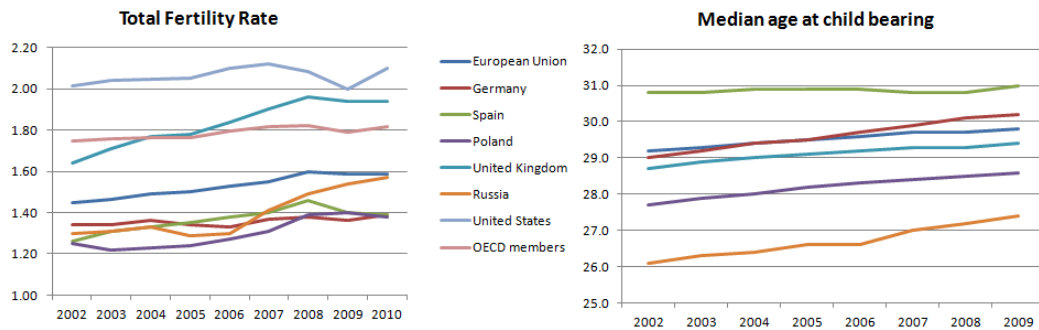
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<sup>1</sup>For a detailed literature review see Billingsley (2010).

<sup>2</sup>[http://w3.unece.org/pxweb/database/STAT/30-GE/02-Families\\_households/?lang=1](http://w3.unece.org/pxweb/database/STAT/30-GE/02-Families_households/?lang=1)

<sup>3</sup>Note the ratio of the adolescent fertility has decreased in the period 2002-2011.

Figure 1.1: Reproductive behaviour



Source: WDI, Eurostat, The Demographic Yearbook of Russia.

beginning of 1980s, the Soviet government introduced a number of reforms to overcome negative trends. In particular, it increased the period of job-protected parental leave from 1,5 to 3 years, and introduced the possibility of flexible working hours for mothers with children. Zakharov (2006) shows that such policy measures stimulated fertility decisions and shifted the age at birth of a first and subsequent children. The policy increased total fertility rates by compensation effect and thus allowed Russian families to complete their reproduction plans. However, the effect ceased to be seen at the beginning of 1990s when the first-birth TFR started to decline.

The rapid fall of fertility began in the late 1980s, when the Russian economy embarked on the transition towards market system, and bottomed at 1,17 at 1999. Avdeev (2003) points out that the observed transition to motherhood has been increasingly postponed as a consequence of the deep economic crisis during the 1990s. The other consequence of the economic decline was switching from a “two children” towards “one child” reproduction-behaviour model.

The persistence of negative trends in fertility during the first half of the 2000s (TFR was around 1,3) led to discussion at government level. In May 2006, during the annual speech to the Russian Federal Assembly, the President stressed the importance depopulation problems and the need to stimulate fertility<sup>4</sup>. The concept of “maternity capital” was introduced as a possible solution to support a female’s decision to have the second and subsequent children. The maternity capital certificate is an 8800-euro voucher that the family can allocate to pre-specified uses: improving of housing conditions, paying for the child’s education or as a contribution to the mother’s pension scheme. The important characteristic is that the parents can only use the money after the child’s third birthday. Therefore the reform creates incentives to have the second and subsequent children in order to create a guaranteed flow of future consumption.

Other important changes were introduced in the parental leave benefits. Prior to 2007, the standard parental leave payment of 15 euros (500 rubles<sup>5</sup>) did not depend on either a mother’s working status or child birth order. Under the new system, the parental allowance accounts for 40% of the rearing-parent monthly gross earnings per child. The law established a minimum payment, depending on the birth order, and a maximum

<sup>4</sup>Source: “The State of the Nation to the Federal Assembly”, 2006. <http://www.rg.ru/2006/05/11/poslanie-dok.html>

<sup>5</sup>Hereinafter I provide information in euro equivalent, using the exchange rate for the relevant year.

payment. A minimum benefit for the second and subsequent children became twice as much as the payment for the first child (in 2007, the guaranteed benefit was 40 euros (1500 rubles) compared to 85 euros (3000 rubles) for the second child). The new legislation came into effect on 1 January 2007. To sum up, such reforms in family policy has been mainly aimed at directly financially stimulating a woman's decision to embark on higher order birth.

The literature broadly considers the impact of financial incentives on fertility decisions<sup>6</sup>. The introduced maternity capital is mostly equivalent to the postponed lump-sum child transfer with a pre-specified usage. In general, research into the lump-sum benefits - "baby bonuses" - confirms the positive impact on fertility decisions. Boccuzzo *et al.* (2008) analyse the impact of a birth bonus system in the Italian region of Friuli-Venezia Giulia. A lump-sum transfer, paid at birth, varies across marital status and birth order. Their findings confirm that the payment introduced decreases the probability of abortion and increases birth rates among females with low income and low education. The response increases with higher birth order. Milligan (2005) studies the effect of a pronatalist child transfer policy, introduced in Quebec, on fertility decisions. The child allowance is a lump-sum transfer paid for a family with a new-born, depending on the parity (birth rank). He finds a significant increase in fertility rates (up to 25%) for families eligible for the full amount. Drago *et al.* (2011) show the positive effect of the Australian Baby Bonus program on fertility intentions and birth rates. Notice that these types of bonuses do not have any restrictions regarding the spending of the payment. It is implicitly assumed that financial benefits enable child welfare to be improved, which is not necessary the case. Using the family allowance data for the United Kingdom, Blow *et al.* (2012) provide the empirical evidence that child benefits are disproportionally spent on adult-assignable goods. Their findings suggest that the result is driven by unanticipated changes in the amount of benefits.

Fewer studies focus on the effect of parental-leave policies on fertility decisions. The empirical evidence regarding the successful outcome of changes in parental-leave allowance to stimulate fertility is mixed. Gauthier (2008) emphasizes that the introduced financial support in parental-leave policies might have a restricted impact depending on income threshold or a certain amount of allowance. Thvenon (2009) documents the polarization of labour supply behaviour: full-time employment is strongly associated with women without children while part-time employment is more linked to having children.

Scandinavian countries are usually refereed as a successful example of the positive impact of parental leave reforms on total fertility rates. The specific characteristic of Nordic policies is that they support women's employment and men's involvement in childcare. In general, the empirical finding confirms that the increase in the leave allowance and the period of payment decrease the birth spacing. Björklund (2006) examines completed fertility patterns for Swedish women born between 1925 and 1958. He applies difference-in-difference strategy using various European countries with less developed family policies as a control group. The findings suggest that the extension of maternal support produced a positive shift in the fertility dynamics of Sweden. The study by Neyer and Andersson (2008) confirms the positive impact of parental leave allowance on the subsequent births. Using Swedish data they document the reduction

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<sup>6</sup>For a detailed analysis see Gauthier (2007) and Thévenon and Gauthier (2011)

in birth spacing in 1980s. The introduced incentives also minimized the differences in fertility behaviour across education groups. Ronsen (2004) considers the effect of parental leave expansion on fertility comparing Norway and Finland. Using micro-data on the Family and Fertility Surveys she estimates the probability of conception for different parities. In Finland, parental-leave policy has a positive significant impact on the probability of second birth, while there is no significant effect in the case of Norway.

Austria and Germany is another important example of countries with negative fertility trends that implement different policy changes in the parental-leave system. During 1990s, the Austrian parental-leave system passed through two important reforms: the 1990 reform extended the paid parental-leave period up to two years, while the 1996 reform reduced it by deducting the last six months. Using Austrian social security data, Lalive and Zweimller (2009) estimate the effect on the probability of return-to-work and a higher-order birth. The difference-in-difference estimation results confirm a strong effect of parental-leave rules on mothers' subsequent fertility behaviour. The fertility increases by 5 percentage points not only in the short run (within three years), but the effect persists in the long run. Buttner and Lutz (1990) considers the introduction of paid leave up to the child's first birthday for a working mother with two and more children in the German Democratic Republic during the 1970s. The authors find significant positive effect on the second and third birth that remains in the long-run. Hofmann and Hohmeyer (2013) show that perceived economic uncertainty in the early 2000s creates a postponement effect in fertility among German couples. Haan and Wrohlich (2011) introduce a structural model of female employment and fertility to estimate the effect of financial incentives. The model calibration is based on the German Socio-Economic Panel data for the period 2000-2006. Their findings confirm that the employment-related financial incentives for working women create small changes in fertility incentives. On the contrary, the child-related financial incentives provide positive and significant fertility effect. In addition, women without children exhibit a higher probability of giving birth.

Few studies analyse whether the recent positive dynamics in birth rates can be attributed to the 2007 reforms. Frejka and Zakharov (2012) show that the fertility rates of second and higher order births were increasing during the post-reformed period while the ratio of transition to motherhood declined. The authors emphasize that the reforms allow women to complete their fertility plans but they did not reshape mothers' preferences for a desired number of children. Zakharov (2012) confirms these findings and emphasises that the current increase in the observed birth rates is due to shifts in the timing of second and subsequent births. Slonimczyk and Yurko (2012) estimate the effect of the reform on the fertility and labour force participation decision using a structural dynamic model. The estimation results do not provide any evidence of a significant positive effect.

Following the literature, I focus on the effect of the introduced financial incentives on the female decision to have a second child. The reform should have a positive impact on the fertility decisions for higher birth-orders through different channels. First, it decreases household income losses during the parental leave. Second, maternity capital can be used as a system of future payments to increase life-quality by improving household conditions and /or decrease child costs using the capital to pay for education.

Therefore, it decreases a marginal price of child quality. Summing up the effect should have a positive impact on second births ((Milligan (2005), Neyer and Andersson (2008), Lalive and Zweimller (2009)). Given the peculiar characteristics of policy design, the response might vary across the employment and education/income categories. I also check whether the gender of the first child and mother's age at first pregnancy change the magnitude of the effect.

Using the Russia Longitudinal Monitoring Survey (RLMS-HSE) for the period 2001-2011, I analyse the impact of the reform on the mother's decision to have a second child. I focus on married couples, since the single (cohabiting) parent faces different financial constraints and higher labour market insecurity. I estimate a binary choice model of fertility exploiting the variation in the individual and household socio-economic characteristics. The results confirm that the reform increased the probability of having a second child. Moreover, the magnitude of this effect depends on the gender of the first-born.

The paper contributes to the empirical literature on the effectiveness of parental-leave reforms in stimulating fertility intentions. It presents new evidence on the relationship between financial incentives and fertility. I find that the reform in the short-run had a significant positive effect on the second birth, which is driven by women in the low-educated and employed category. In addition, the magnitude varies across the gender of a first-born. For a mother with a girl as the first child, the probability of having a second birth increased after the reform was implemented. The reform has no additional impact for the families in poor housing conditions, even though housing remains one of the important factors determining fertility decisions.

The paper is organized as following. I provide details on the Russian system of maternity support in Section 2. Section 3 discusses empirical specification and data set. In Section 4, the main findings and robustness check are presented. Section 5 concludes.

## 1.2 Institutional background

The following section provides an institutional background of the Russian family policy system and discusses the 2007 maternity capital reform.

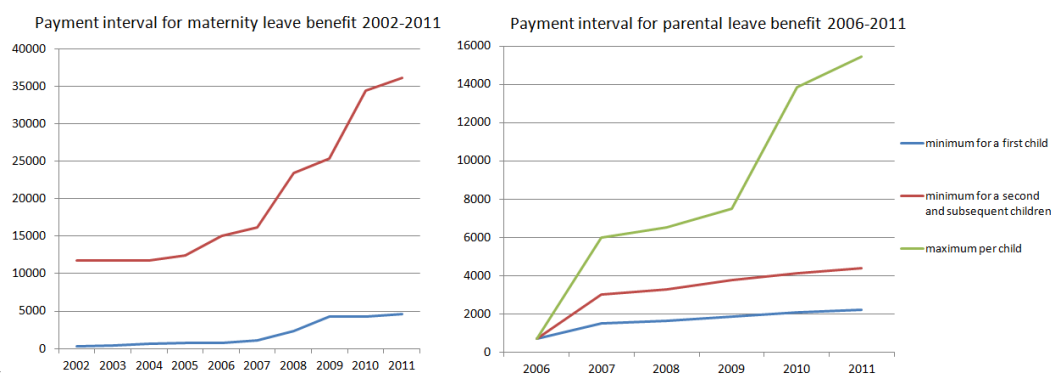
### 1.2.1 Family policy in Russia

The current Russian system of family policy inherits the main components of the Soviet Union system reformed in the 1980s, when the negative trends in depopulation forced the government to create additional incentives for future mothers. In the same way as France, Germany and North European countries, Russia proclaims family support at a national level. The major issues relating to family institution are regulated by the "Russian Federation Family Code" enacted in 1995 and a number of federal laws <sup>7</sup>.

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<sup>7</sup>"Governmental child allowances" Federal Law from 19 May 1995; "Allowances for temporary disability, pregnancy and delivery of citizens under compulsory social insurance" Federal Law from 29

Figure 1.2: Financial support



Note: The minimal legal wage is adjusted to the beginning of the applicable year since it is not necessarily defined as the beginning of the calendar year. I do not account for the regional adjustment, which might provide additional variations in financial incentives. Source: Russian federal laws, various years.

During 2005-2006, the government initiated the reforms in family policies to overcome the negative trends in fertility rates, observed during the 1990s and the early 2000s. The main characteristics of the system and policy changes introduced in the period in question are discussed below.

According to the current system, women have access to maternity leave and parental leave irrespective of their working status. The financial support of a mother with a new-born consists of the benefits and transfers guaranteed by social security system. It includes maternity leave and parental-leave benefits, child-birth grants and maternity-capital certificates. Child benefits are almost universal in Russia, but the eligibility and amount of payments significantly varies among the working status of women.

The maternity leave system consists of 20 paid weeks, which are typically divided into 10 weeks before childbirth and 10 weeks afterwards. During maternity leave, a woman is insured against dismissal. If a woman in employment is eligible for social insurance, she receives maternal benefits during the whole period of leave. The monthly coverage is equal to the average gross earnings, the maximum amount is legally regulated and the minimum benefit is a guaranteed minimum legal wage. Additionally, specific categories of women - working in the army, continuing their education or those made redundant due to company liquidation - are also eligible for a leave payment, but the amount significantly decreases. The unemployed and uninsured self-employed women do not receive any maternal benefits. The minimum and maximum payments vary significantly during the period 2002-2011 considered as Figure 1.2 shows.

There is a system of lump-sum transfers aimed at maintaining the quality of health of a mother and a child. Firstly, a woman gets a small lump-sum transfer if she reports her pregnancy to the medical health centre during the first trimester. During the pregnancy, she is eligible for free medical treatment, free-of-charge birth delivery in the hospital, and clinical check-ups during the first year of motherhood. Before 2006, a woman was assigned to the health centre and the hospital according to a local address. From 2006, a new birth voucher system was implemented. The birth voucher with a

nominal value of 283 euros (10000 rubles<sup>8</sup>) consists of

- coupon for payments of the prenatal visits at the health centre (nominal value 85 euros (3000 rubles));
- coupon for payments of the delivery in hospital (nominal value 170 euros (6000 rubles));
- coupon for payments of the child clinical check-ups during the first year of life<sup>9</sup>(nominal value 28 euros (1000 rubles)).

A woman gets the voucher certificate after the 30th week of her pregnancy. The new system allows the women to decide which prenatal facilities and hospital to use without any location restriction. The only requirement is to have had 12 weeks of continuous prenatal visits in the health centre. When the child is born, a woman gets an additional lump-sum payment per child. In 2002, the amount was 135 euros (4500 rubles), it was then fixed at 235 euros (8000 rubles) in 2006, and the amount was increased to 275 euros (10889 rubles) in 2011.

The principal characteristics of Russian parental leave remained unchanged during the 2000s. Parental leave starts immediately after maternity leave and lasts until the child's third birthday. The mother, father or other relatives could share job-protected parental leave. The parental allowance is paid to the carer until the child is 18 months old. There is no work requirement to be eligible for the allowance. However, the amount of the allowance became one of the important reform changes relating to the financial component. Prior to 2007, the amount of the allowance was a uniform month transfer of 15 EUR (500 RUR)<sup>10</sup> per child irrespective of salary and birth order. Under the new system, the parental allowance accounts for 40% of the rearing-parent monthly gross earnings per child. The legislation determined the minimum payment, depending on the birth order, and maximum payment. For instance, in 2007 the minimum benefit was 40 euros (1500 rubles) for the first child and 85 euros (3000 rubles) for the second and subsequent births, and the maximum payment per child could not exceed 170 euros (6000 rubles). The limits are adjusted to the inflation. Figure 1.2 shows the dynamics of parental leave allowance limits. The important characteristic of the reform became an inflation adjustment of the payments relating to child support. The new system was established at the end of 2006 and started to be applicable for children born after 1 January of 2007. To sum up, the new system of parental leave became more generous as it introduced the significant variation in the financial incentives of the fertility decision. The differentiation in payments for the first new-born and the second (subsequent) child might create additional incentives for the high order births.

Russian families are eligible for a number of tax allowances. All the child-related benefits are excluded from taxation. In addition, the child tax allowance can be deducted from taxable income of both parents for each child under the age of 18 years, to the tune of 400 Euro (14000 rubles) per year. The family also receive financial aid - child benefit, food and clothes stamps, medication and housing benefits - from the regional government. The amount and the form of support vary significantly at territorial level.

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<sup>8</sup>The certificate nominal value is not adjusted to inflation

<sup>9</sup>The third birth voucher component was introduced on 1 of January 2007

<sup>10</sup>In 2006, the payment was raised slightly up to 20 euros (700 rubles)



## 1.2.2 Maternity capital reform 2007

The important novelty of the 2007 family policy reforms was the introduction of the “maternity capital” concept. A woman, who gives birth<sup>11</sup> to a second<sup>12</sup> or a subsequent child, becomes entitled to the maternity capital certificate. It is a voucher with a fixed nominal value that a family could allocate to pre-specified uses: improvement of housing conditions, payment for the child’s education, or contribution to the mother’s pension scheme. Mothers can apply for a certificate only once after the child’s third birthday. The initial value was about 7000 euros (250000 rubles), which has been inflation adjusted each year. In 2011 the nominal value was around 8800 euros (365278 rubles). Note that the mother gets the value in the year of usage, even if the nominal value in the issued year was smaller. Therefore the family can decide to receive funds later or use them in parts.

The official statistics do not provide any information on the number of applications and forms of usage of maternity capital<sup>13</sup>. During the period 2007-2011, the Russian Pension Fund issued around 3300 thousands certificates (339 thousands in 2007, 700 thousands in 2011). Only 26% of entitled parents claimed the money. The total amount spent by the budget is 6.7 billion euros (270.953 billion rubles), around 98,1% of expenditure went on improving housing conditions<sup>14</sup>. The programme costs for the government were around 0,72% of total government expenditure for the period 2010-2011<sup>15</sup>. Given the take-up ratio of the certificates, I should expect significant increase in public expenditure on the maternity capital.

The maternity capital concept underwent a quick legislative process. In May 2006, during the annual speech to the Russian Federation Federal Assembly, the President emphasized the importance of the demographic problems and pointed out that “we must stimulate the birth of at least a second child”. The maternity capital concept was introduced together with the conditions of use, the initial amount of financial support, “at least 250 thousands rubles”, and the implementation date - 1st January 2007<sup>16</sup>. The consecutive legislative process was simply a technical issue. The government introduced the project to the Russian Parliament in October 2006 and the law was approved in December 2006. Given the timing of the reform, only a relatively small group of couples did not anticipate that the new regulation would be in force at the time of birth<sup>17</sup>. Since the discussion of maternity capital started in the media around June 2006, it is hard to justify the absence of anticipation effects for females subsequently conceiving. In addition, women were informed about the changes in parental leave allowance, thus

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<sup>11</sup>The law guarantees the same financial assistance to adopted children, which are beyond the scope of this paper.

<sup>12</sup>If twins are born, the voucher certificate is only allocated to one of the children.

<sup>13</sup>The only available sources are press-releases of the Russian Pension Fund and the Ministry of Healthcare.

<sup>14</sup>Source: Ministry of Healthcare <http://www.rosminzdrav.ru/health/child/154>; <http://www.rosminzdrav.ru/docs/mzsr/analytics/2>

<sup>15</sup>Source: Government expenditure reported by the Federal State Statistics Service [http://www.gks.ru/wps/wcm/connect/rosstat\\_main/rosstat/ru/statistics/publications/catalog/doc\\_1138717651859](http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138717651859)

<sup>16</sup>Source: “The State of the Nation to the Federal Assembly”, 2006. <http://www.rg.ru/2006/05/11/poslanie-dok.html>

<sup>17</sup>Children born in January, February and March 2007

stimulating the birth of second and subsequent children.

Overall, the Russian family support system varies greatly in financial incentives across different income and working female categories and that can be used for identification. The 2007 reforms provided an additional dimension creating variation in the conception decisions of first and second children. The maternity capital accompanied by the increase in parental leave allowance could create additional incentives in the conception decision of the second and subsequent children. Given the timing of the reform, a woman was likely to anticipate the changes in government's financial support by making fertility decision.

## 1.3 Empirical Specification and Data Description

### 1.3.1 Empirical model

The purpose of the paper is to identify whether the 2007 reform has an impact on women fertility in the short run. I examine a decision to have a second child within the static Becker *et al.* (1960) framework. Children are considered as a durable consumption good - a source of income and satisfaction. The utility associated with children can be defined through a system of parents' preferences. Parents maximize utility from their consumption, leisure and a number of children according to a set of time and money constraints. There are two group of costs associated with children: direct costs (spending on rearing, education etc.) and opportunity costs (income losses during the leave period, human capital depreciation and missed career opportunities). The important dimension of the optimization problem is a children quality. "Family must determine not only how many children it has but also the amount spent on them whether it should provide separate bedrooms, send them to nursery school and private colleges, give them dance or music lessons, and so forth."<sup>18</sup>. A "high quality" child is associated with an amount of parents' investment. The higher prices of "quality" might generate a decrease in the number of children. Within this framework, the Russian family policy reforms, discussed in Section 2, might positively effect a woman's fertility decision given her preferences for motherhood. The maternity capital provides relief on the direct costs of children "quality", while the increase in parental leave benefits reduces both direct and indirect costs through mothers' income.

The 2007 maternal capital reform might create non-linear response in fertility decisions of various family groups. The focus of the study is on whether the reform had a significant impact on the family decision to have a second child. I consider the following hypotheses:

- the reform increased the probability of second birth;
- it had a higher positive effect for the families with restricted housing conditions;
- it had an impact on women with higher education/income;
- it had an additional impact for a group of mothers with a first-born girl.

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<sup>18</sup>Becker *et al.* (1960)

I assume that women were anticipating changes by making their decision. The reform was widely discussed in public and was quickly passed by parliament <sup>19</sup>.

The empirical advantage of the 2007 reform is that it has created a significant variability in household financial incentives. First, the allowance has increased across all income groups: the lowest payment under the new system is significantly larger than the uniform payment under the old system. Second, higher-income households experienced larger benefit gains than low-income households.

Following Haan and Wrohlich (2011), I assume that in each period of time a woman optimally decides about her employment and number of children to avoid the problem of household bargaining, i.e. she maximizes the household utility conditioning on her partner's behaviour. At given date  $t$  for the household  $i$  the female choice set is  $L_{it} \times F_{it}$  combinations, where  $L_{it} = 1$ , if woman works, 0 otherwise, and  $F_{it} = 1$ , if time point  $t$  is optimal to give a birth. A woman decides to give a birth being employed or unemployed, therefore the net household income varies on the set of choices:

- (0, 1) the woman does not work, a birth occurs.
- (1, 0) the woman works, no birth occurs.
- (0, 0) the woman does not work, no birth occurs.

The estimation is aimed at capturing the changes in maternity incentives in response to the financial incentives introduced. The variable of interest is a fertility decision  $F_{it}$ , binary outcome equal to 1 if she gave a birth at the period  $t$ , 0 if the child birth does not occur. Let  $D_i t$  indicate a mother's treatment status, where  $D_i = 0$  if she was making her conception decision under the old regime, and  $D_i = 1$  under the new ones.

The birth probability is defined by the socio-economic characteristics at individual, household and regional levels. There is a natural time interval between pregnancy and delivery, the characteristics of previous period would define the birth outcome in the current period. I account for a potential effect of future flow of parental benefits through labour income, as the amount of the allowance depends significantly on the labour income of the preceding year under the new system. I also account for current family housing conditions, given the evidence of usage of maternity capital to improve the household conditions. The estimation equation is following:

$$Pr(F_{it} = 1 | controls) = \beta_0 + \beta_1 d_i + \beta_2 empl_{it-1} + \beta_3 d_i empl_{it-1} + \beta_4 boy1_i + \beta_5 d_i boy1_i + \sum_{i=6}^k \beta_i X_{1it-1} \quad (1.1)$$

where  $F_{it}$  is the birth delivery at period  $t$ ;  $d_i$  is a policy indicator, equal to 1 after 2007;  $empl_{it-1}$  and  $income_{it-1}$  are the employment status and income in the preceding year;  $house_{it-1}$  is housing conditions;  $boy1_i$  is the gender of first child,  $boy1_i = 1$  for boys.

Following Laroque and Salanie (2008), the identification relies on the variation in finan-

<sup>19</sup>I exclude women with new-borns in January, February and March 2007 because they potentially were not aware of the introduced changes (the reform discussion was initiated later). Women with a child born in December 2006 are also excluded, because they might have shifted their birth towards January 2007 when the new parental system came into force

cial incentives induced by the 2007 reforms, variation in the partner's labour income and housing conditions. I estimate the model 1.1 from various functional specifications: linear probability and probit models. The control group consists of females making their conception decision prior to 2007 and the treated group - mothers with conception decisions after 2007. The estimation identifies whether the reform has an impact on the birth timing controlling for other socio-economic characteristics. I use information on mothers' characteristics only in the period before birth ( $t - 1$ ) exploiting the variation of individual decisions in cross-sectional dimension and controlling for time effects.

### 1.3.2 Data and descriptive evidence

The empirical analysis is based on the Russia Longitudinal Monitoring Survey (RLMS-HSE). It is a set of national surveys to collect information on health and economic welfare from the representative sample of Russian private households; region-specific prices and community infrastructure.<sup>20</sup> It currently covers around 6,000 households, 22,000 adult respondents and 5,000 children living in the surveyed households. To analyse the effects of the maternity capital reform on the fertility decisions of women, the RLMS-HSE provides detailed information on family composition, child-birth timing and various personal and economic characteristics of the household members.<sup>21</sup> I focus on households consisting of married couples to avoid the potential problem of systematic difference with cohabiting women. A cohabiting woman is eligible for additional child payments as a single mother, even if she might get a financial support from her partner. I assume that there was no significant variability in the household decisions to have children through other policy measures.

The dataset is constructed using ten waves for 2001-2010. The total sample consists of 1347 women (with a first-born) and with a reproductive age between 20 and 40<sup>22</sup>, who gave birth to 298 offsprings within the period in question (22,1%). For a group with parity equal to one 42,7% of births occurs after the reform, while for a group with parity two - 54,2%.

Since the main focus of the analysis is a fertility decision, I follow each mother up to the birth. Females who do not have a birth are observed for the whole period in question. A woman leaves the sample after her 40th birthday. Monthly information on employment, periods of maternity leave and month of the birth of the child allows us to identify the explanatory variables around the conception decision. To account for employment effects, I control for various employment statuses relating to the decision to conceive by constructing the following categories:

- a woman is employed;
- a woman is unemployed;
- a woman is on parental leave.

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<sup>20</sup>For more detailed information see <http://www.hse.ru/en/rlms/about>.

<sup>21</sup>The questionnaire covers such issues as time of pregnancy, mother health status, including the information on the support of a partner.

<sup>22</sup>I exclude women who first became pregnant when were a minor.

As discussed in Section 2, the maternity capital is mostly likely used for mortgage payments. To account for an effect of the improving housing conditions, I construct the variables of total area and living area per family member measured in square metres per person<sup>23</sup>.

The targeted sample represents two groups. The first group is women who have their second birth within the period in question. I follow each woman up to the moment of birth, thus after a transition into motherhood a woman leaves the sample<sup>24</sup>. I only consider women observed at least before and at the year of birth. Using the birth date and interview date information, I identify their socio-economic characteristics around the period of conception.

The second group consists of married women who remained with one child within the period in question<sup>25</sup>. Women whom I do not observe till 2011 are excluded from the sample. Their characteristics at  $t - 1$  defines the absence of birth at  $t$ .

The final sample consists of 1347 women, among them 298 women who gave birth to their second offspring within the period considered<sup>26</sup>. The income variables are adjusted to the 2001 base using regional consumer price indexes. The main summary statistics of the variables are presented in Table 1.1. The explanatory variables are measured at the last employment spell prior to the birth.

Table 1.1 shows that there is almost no differences in the socio-economic characteristics of mothers who had a second birth in the period 2002-2010. The average age at conception decision is 28 years and the birth interval between children slightly decreasing after the reform was implemented. As expected the share of unemployed women who decided to have children has declined, while the number of family members per household has increased by almost 9%. However, there have been no changes in housing conditions. On average, women who remain with one child, are older, are more likely to live in the city rather than rural areas and have poorer housing conditions. Summing-up, the preliminary analysis does not provide any significant evidence of the positive policy effects.

## 1.4 Results

### 1.4.1 Estimation Results

The model 1.1 presented in section 3 is estimated using the linear probability and probit specifications. The baseline estimation includes the main socio-economic characteristics of a mother at the time of deciding to conceive: her age and education, employment status and average reported salary. I control for the dwelling location: urban or rural

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<sup>23</sup>I do not include property type in the analysis because only 14% of the sample is in rented accommodation

<sup>24</sup>I exclude mothers with twins at the first birth as they consider second pregnancy as a decision to have a third child. Women who gave birth to twins at their second pregnancy are treated as a single unit.

<sup>25</sup>Note that women who had the first birth in the period 2002-2009 enter in the sample

<sup>26</sup>I exclude women who gave birth during December 2006 and February 2007 as they might not be aware of the reform at the time of the decision to conceive, but they were treated.

Table 1.1: Descriptive statistics

	Women with a second child		Women with one child		Mean test	Within period comparison
	Before 2007	After 2007	Before 2007	After 2007		
Personal characteristics	(1)	(2)	(3)	(4)	(3)-(4)	(2)-(4)
age	27.97 (4.084)	28.80 (4.282)	30.82 (5.563)	30.90 (5.421)	0.08020 (0.18234)	2.85656*** (0.395)
city	0.602 (0.492)	0.667 (0.473)	0.742 (0.438)	0.710 (0.454)	-0.03156** (0.01492)	0.13999*** (0.034)
education	17.58 (3.041)	17.70 (3.349)	17.49 (3.082)	17.71 (3.385)	0.21880** (0.10922)	0.00905 (0.250)
employed	0.621 (0.487)	0.657 (0.476)	0.651 (0.477)	0.651 (0.477)	0.00037 (0.01588)	-0.00542 (0.035)
unemployed	0.291 (0.457)	0.202 (0.403)	0.252 (0.435)	0.220 (0.414)	-0.03227** (0.01406)	0.03881 (0.031)
parental leave	0.0777 (0.269)	0.126 (0.333)	0.04859 (0.03798)	0.122 (0.328)	0.03729*** (0.01034)	0.00718 (0.024)
BMI	23.93 (4.308)	24.44 (4.583)	24.31 (4.464)	24.01 (4.477)	-0.30355** (0.15472)	0.38076 (0.338)
boy1	0.544 (0.501)	0.500 (0.501)	0.475 (0.500)	0.474 (0.499)	-0.00160 (0.01664)	-0.02614 (0.037)
boy2	0.476 (0.502)	0.530 (0.500)	0.05457 (0.06085)			
birth interval	6.831 (3.437)	6.510 (3.899)	-0.32081 (0.45533)			
Partner characteristics						
age	30.33 (4.762)	31.24 (5.390)	33.50 (6.212)	33.83 (6.414)	0.32807 (0.219)	3.1719*** (0.481)
education	16.70 (3.570)	16.70 (3.573)	16.70 (3.179)	16.55 (3.713)	-0.14707 (0.122)	-0.0031 (0.336)
employed	0.825 (0.382)	0.843 (0.364)	0.784 (0.412)	0.842 (0.365)	0.05831*** (0.013)	-0.0011 (0.027)
unemployed	0.117 (0.322)	0.0960 (0.295)	-0.02055 (0.037)	0.0956 (0.294)	-0.02994*** (0.010)	0.0090 (0.034)
BMI	25.14 (3.591)	25.57 (3.935)	25.15 (4.110)	25.79 (3.957)	0.64864*** (0.145)	0.2217 (0.309)
Housing conditions						
number of members	3.369 (0.828)	3.742 (1.407)	3.475 (0.999)	3.569 (1.193)	0.09317** (0.037)	0.1065 (0.089)
sqmetre per person	17.40 (7.495)	16.40 (7.327)	15.13 (5.953)	15.47 (6.846)	0.33924 (0.223)	-2.2705*** (0.644)
living sqmetre per person	11.11 (5.129)	10.31 (4.499)	9.634 (4.150)	9.890 (4.981)	0.25612 (0.160)	-1.4754*** (0.448)

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

area<sup>27</sup>. I consider an additional specification including the determinants that might have an impact on the second birth decision. I use total living area per person as a proxy for housing conditions. Since the literature (see Blackburn *et al.* (1993)) establishes that age at birth follows a bell-shaped curve, I consider a quadratic specification of age function. Following Bratti and Tatsiramos (2011) I include an age at first birth to control for the effect of delaying motherhood on the transition into second birth. To account for a possible bias in parental preferences of children sex composition<sup>28</sup> I include gender of first child. Table 1.2 summarizes the estimation results. For the probit specification the coefficients report marginal effects.

The baseline estimation results show that the probability of having a second child is higher for employed women. There is an inverse U-shaped association between fertility and age. If a family lives in the city, the probability of having a second child decreases. The income variable does not have any significant impact on the decision. The housing conditions have positive significant impact on the probability of having a second child, which is consistent with previous findings<sup>29</sup>. It is interesting to note that the probability of a second birth increases if the first child was a boy, which potentially indicates asymmetry in gender preferences of parents. The partner's characteristics do not have any influence on the observed fertility decisions. The only significant impact that the husband provides on the family decision is age, as the older partner decrease the probability of having a second child. The main variable of interest - policy - has positive but insignificant impact on the probability of a second birth.

Second part of Table 1.2 shows the estimation results for a specification 1.1, including all the policy interactions discussed in Section 3. I do not find any shift in birth probability conditioning on the employment status and labour income, housing condition and gender of the first child. The policy variable still does not have any significant impact on the fertility decision (the last four columns of Table 1.2).

The 2007 reform on parental leave payment, discussed in Section 2, creates different financial incentives for employed and unemployed mothers. In addition, unemployed mothers have a lower probability of finding employment with a small child while employed mothers are legally protected against dismissal. It might create non-linear response in introduced incentives. I split the sample and estimate the effect of the reform for employed and unemployed women (76.7% and 23.3% respectively).

Table 1.3 presents the estimation results. For mothers who were employed at the time of deciding to conceive, I observe a significant positive effect of introduced policy changes on the probability of having a second child. Female income is still negatively associated with fertility. One possible explanation is that the costs of birth-related career interruption might be smaller for a high-income earners than for a lower-paid category. The effect of the male gender of the first child and housing conditions persists in the sample.

The results change drastically for unemployed mothers. First, the variables of interest

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<sup>27</sup>Boykov and Roshchina (2005), Roshchina and Cherkasova (2009) show the differences in the fertility decision between rural and urban areas.

<sup>28</sup>For a detailed analysis see Hank (2007).

<sup>29</sup>Curtis and Waldfogel (2009) show that the housing conditions partially explain the variation in fertility decision among married couples in the US.

Table 1.2: Estimation results

	LP	Probit	LP	Probit	LP	Probit	LP	Probit	LP	Probit
Policy	0.01081 (0.0083)	0.01143 (0.0074)	0.00792 (0.0088)	0.00871 (0.0078)	0.04445 (0.0288)	0.02824 (0.0211)	0.04248 (0.0298)	0.02681 (0.0216)		
Age	0.02537*** (0.0087)	0.03980*** (0.0092)	0.02571*** (0.0091)	0.03965*** (0.0095)	0.02491*** (0.0087)	0.03888*** (0.0092)	0.02523*** (0.0091)	0.03890*** (0.0095)		
Age2	-0.00051*** (0.0001)	-0.00075*** (0.0001)	-0.00047*** (0.0001)	-0.00071*** (0.0002)	-0.00050*** (0.0001)	-0.00073*** (0.0001)	-0.00047*** (0.0001)	-0.00069*** (0.0002)		
Education	0.00113 (0.0014)	0.00117 (0.0012)	0.00093 (0.0015)	0.00099 (0.0013)	0.00120 (0.0014)	0.00120 (0.0012)	0.00095 (0.0015)	0.00100 (0.0013)		
Employment	0.02272** (0.0109)	0.01541* (0.0090)	0.02453** (0.0115)	0.01665* (0.0094)	0.01189 (0.0149)	0.00738 (0.0137)	0.01698 (0.0158)	0.01122 (0.0140)		
Average monthly salary	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)		
City	-0.01183 (0.0099)	-0.01060 (0.0086)	-0.01742* (0.0104)	-0.01583* (0.0093)	-0.01112 (0.0099)	-0.00992 (0.0085)	-0.01699 (0.0104)	-0.01524* (0.0092)		
Area per person	0.00282*** (0.0007)	0.00210*** (0.0005)	0.00265*** (0.0007)	0.00203*** (0.0005)	0.00463*** (0.0014)	0.00310*** (0.0009)	0.00441*** (0.0014)	0.00298*** (0.0009)		
Age at first birth	-0.00211* (0.0013)	-0.00248 (0.0016)	-0.00244* (0.0014)	-0.00249 (0.0016)	-0.00201 (0.0013)	-0.00228 (0.0015)	-0.00238* (0.0014)	-0.00234 (0.0016)		
First child is a boy	0.01388* (0.0083)	0.01273* (0.0075)	0.01095 (0.0088)	0.01023 (0.0078)	0.02440* (0.0131)	0.02247* (0.0128)	0.02172 (0.0139)	0.02095 (0.0132)		
Policy interaction: Employment										
Average monthly salary										
Area per person										
First child is a boy										
Partner characteristics: Education										
Employment										
Average monthly salary										
N	3987	3987	3735	3735	3987	3987	3735	3735	3987	3735

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .



Table 1.3: Estimation results: employment status.

	Employed women			Unemployed women			
	LP	Probit	LP	LP	Probit	LP	
Policy	0.03171*** (0.0109)	0.02708*** (0.0086)	0.02717** (0.0114)	-0.00365 (0.0180)	-0.00488 (0.0164)	0.00132 (0.0194)	Probit -0.00141 (0.0175)
Age	0.02670** (0.0126)	0.04894*** (0.0122)	0.02954** (0.0130)	0.01961 (0.0169)	0.03259* (0.0180)	0.01688 (0.0175)	0.02766 (0.0183)
Age2	-0.00055*** (0.0002)	-0.00090*** (0.0002)	-0.00053*** (0.0002)	-0.00039 (0.0003)	-0.00063** (0.0003)	-0.00034 (0.0003)	-0.00054* (0.0003)
Education	0.00161 (0.0017)	0.00144 (0.0014)	0.00140 (0.0018)	0.00162 (0.0027)	0.00132 (0.0025)	0.00344 (0.0028)	0.00302 (0.0027)
Average monthly salary	-0.00000*** (0.0000)	-0.00000** (0.0000)	-0.00000*** (0.0000)	-0.00000** (0.0000)	-0.00000** (0.0000)	-0.00000** (0.0000)	-0.00000** (0.0000)
City	-0.00438 (0.0129)	-0.00422 (0.0096)	-0.00914 (0.0134)	-0.00519 (0.0190)	-0.00459 (0.0172)	-0.00618 (0.0198)	-0.00506 (0.0180)
Area per person	0.00469*** (0.0011)	0.00283*** (0.0006)	0.00459*** (0.0010)	-0.00049 (0.0011)	-0.00064 (0.0013)	-0.00085 (0.0011)	-0.00098 (0.0013)
Age at first birth	0.00037 (0.0015)	-0.00000 (0.0017)	-0.00053 (0.0016)	-0.00318 (0.0027)	-0.00315 (0.0032)	-0.00189 (0.0030)	-0.00148 (0.0034)
First child is a boy	0.02160** (0.0108)	0.01629* (0.0086)	0.01634 (0.0112)	0.00014 (0.0173)	-0.00114 (0.0161)	0.00419 (0.0184)	0.00319 (0.0171)
Partner characteristics:							
Age			-0.00426*** (0.0014)		-0.00453*** (0.0015)	-0.00041 (0.0019)	-0.00024 (0.0018)
Average monthly salary			0.00000* (0.0000)		0.00000* (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)
N	2312	2312	2179	914	914	844	844

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

become insignificant. Second, the sign of the policy effect changes and it is negative. It might partially explain the insignificant policy effect on the whole sample, as the signs of the effect are opposite. The housing conditions also have an insignificant negative impact. Note that the sample size of the unemployed group significantly decreases, so the findings should be interpreted with caution. In further analysis, I will focus on the group of employed married women.

The parental preferences on child's gender may be an important factor on their fertility decision. The results above shows that if the first child is a male the probability of having a second child increases, which can be related to the intention to complete the family size<sup>30</sup>. Given the preferences for the male gender, I expect that the reform might produce an additional effect for families, where the first child is a girl. I estimate the specified model for two family types: a first child is a girl and a first child is a boy.

The results of estimation, presented in Table 1.4, provide an empirical evidence that the reform has produced an asymmetric response in fertility decisions. The probability of having a second child has increased for a family with a first-born girl while a family with first-born boy does not respond to the introduced incentives.

The main goal of the paper has been to evaluate whether the introduced financial incentives affect the probability of having a second child. The estimation results show that the positive impact is insignificant for the whole sample. However, the policy had a significant positive impact for a category of employed women during the conception decision, increasing the probability of a second child by 2,7 percentage points. The results also show that improved housing conditions influence fertility decisions, increasing probability by 0,28 percentage points. Having a first-born girl is an amplifying factor on the policy effect. In families with a girl, the probability of having a second child after the reform increases by 3,1 percentage points.

## 1.4.2 Robustness Check

The following robustness checks were performed on the regressions for the employed category of mothers. Given that the probability of having a second child is a quadratic function of age, the conception probability is likely to vary with age. I consider the age brackets 20-30 and 30-40<sup>31</sup>. The results presented in Table1.5 in the Appendix are robust to age specification, but the magnitude of the effect varies slightly. Note that the probability of having a second child increases in age for a younger group and then start to decrease. The negative impact of husbands' age on the probability of a second child might capture the age differences of spouses. Using age difference (age of the wife - age of the husband) instead of age still confirms the impact of the policy. In addition the probability of having children becomes higher if the differences in ages increase (Table1.6 in Appendix).

Regarding the employment status and income variables, I use various definitions of income: constructed wages per hour and total income, reported income for a last month. I also control whether the work is part-time or full-time and use working

<sup>30</sup>Frejka and Zakharov (2012) reports that the desired parity is equal to two.

<sup>31</sup>The sample size do not allow the lower intervals.

Table 1.4: Estimation results: gender of the first child.

	First child is a boy				First child is a girl			
	LP	Probit	LP	Probit	LP	Probit	LP	Probit
Policy	0.01979 (0.0166)	0.01666 (0.0126)	0.01039 (0.0168)	0.00651 (0.0119)	0.04474*** (0.0142)	0.03497*** (0.0111)	0.04228*** (0.0151)	0.03176*** (0.0113)
Age	0.02779 (0.0200)	0.04499** (0.0185)	0.03599* (0.0211)	0.04384*** (0.0167)	0.02658* (0.0155)	0.04588*** (0.0148)	0.02891* (0.0162)	0.04796*** (0.0152)
Age2	-0.00060* (0.0003)	-0.00087*** (0.0003)	-0.00063** (0.0003)	-0.00076*** (0.0003)	-0.00051** (0.0002)	-0.00082*** (0.0002)	-0.00051** (0.0002)	-0.00081*** (0.0002)
Education	-0.00312 (0.0028)	-0.00221 (0.0020)	-0.00425 (0.0029)	-0.00260 (0.0017)	0.00579*** (0.0021)	0.00502** (0.0020)	0.00663*** (0.0022)	0.00566*** (0.0020)
Average monthly salary	(0.0000)	(0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000*** (0.0000)	-0.00001*** (0.0000)	-0.00000*** (0.0000)	-0.00000** (0.0000)
City	-0.00138 (0.0188)	-0.00055 (0.0139)	-0.00823 (0.0191)	-0.00282 (0.0133)	-0.00179 (0.0176)	-0.00185 (0.0126)	-0.00644 (0.0184)	-0.00584 (0.0135)
Area per person	0.00888*** (0.0019)	0.00523*** (0.0010)	0.00961*** (0.0019)	0.00517*** (0.0010)	0.00222* (0.0011)	0.00135** (0.0006)	0.00161* (0.0009)	0.00111** (0.0005)
Age at first birth	0.00427* (0.0024)	0.00361 (0.0024)	0.00206 (0.0025)	0.00201 (0.0023)	-0.00341* (0.0020)	-0.00339 (0.0021)	-0.00364* (0.0021)	-0.00357* (0.0022)
Partner characteristics:								
Age			-0.00668*** (0.0023)	-0.00585*** (0.0020)			-0.00285* (0.0017)	-0.00299* (0.0018)
Average monthly salary			0.00001*** (0.0000)	0.00000*** (0.0000)			0.00000 (0.0000)	0.00000 (0.0000)
N	1115	1115	1058	1058	1197	1197	1121	1121

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

hours instead of labour income. Controlling for the different categories, I find the same pattern in terms of policy effect on the probability of second child. Other factors do not change significantly their sign and magnitude. The estimation results are reported in Tables 1.7 and 1.8 in Appendix.

The empirical findings in the literature on the estimation of policy effects on maternity suggest that the magnitude of the response might highly vary across educational categories. I consider the alternative specifications using educational levels instead of number of years. I reestimate the model for the following groups: high school education, technical school education and university degree, using the highest level of education obtained. The estimation results are presented in Tables 1.9 and 1.10 in Appendix. The observed policy effect is still positive across all groups. However, it remains significant only for females with the highest obtained level - high school certificate. It implies that the reform produced incentives for a low-educated group of women that might be characterized by lower career incentives and lower salaries.

## 1.5 Conclusion

This paper presents new evidence on the financial incentives and fertility. It shows that the 2007 family reforms create non-linear response in fertility decisions of various female groups. For the whole sample I find a positive, but insignificant impact on the decision to have a second child. It is consistent with findings by Slonimczyk and Yurko (2012). However, the reform has a significant impact for a specific category - employed women. The probability of the second birth has increased after the implementation. These findings confirm the empirical results of the parental leave and child bonuses literature (Milligan (2005), Neyer and Andersson (2008), Lalive and Zweimller (2009)). The effect is driven by the low-educated group of women who potentially belong to low-income group. In addition, there is a heterogeneous response across the gender of a first child: mothers with a first girl have a higher probability of giving birth after the reform was implemented. The possible interpretation of this result is a gender bias in maternal preferences of Russian couples towards boys. Therefore, the reform might stimulate the parents intentions to have a boy relieving economic constraints. These findings are new to the previous research on the child gender preferences in European countries (see Andersson *et al.* (2006)). The reform has no additional impact for the families with restricted housing conditions, even though housing conditions remain the important factor determining fertility decision.

Overall, I interpret it as results confirming the positive impact of the reform on the fertility decision. The results provide some insights into the socio-economic characteristics of the responding women heterogeneity. The magnitude of the results should be interpreted with caution because of the possible selection bias. The other important restriction is that I cannot distinguish the effects of maternity capital and changes in parental leave allowance on the reproductive behaviour. The observed shift in the fertility might also be a tempo effect when families just complete their desired fertility by shifting the time of their decision to conceive. Further research would be to analyse whether the reform has a significant effect on birth spacing.

## 1.6 Appendix



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Table 1.5: Estimation results: age interval

	Age of mother 20-29		Age of mother 30-39	
	LP	Probit	LP	Probit
Policy	0.04787* (0.0247)	0.04679** (0.0227)	0.02740** (0.0109)	0.02260*** (0.0086)
Age	0.00854 (0.0054)	0.00809 (0.0052)	-0.01086*** (0.0016)	-0.00917*** (0.0013)
Education	0.00429 (0.0035)	0.00453 (0.0036)	0.00139 (0.0019)	0.00136 (0.0016)
Average monthly salary	-0.00001* (0.0000)	-0.00001 (0.0000)	-0.00000*** (0.0000)	-0.00000** (0.0000)
City	-0.04573* (0.0269)	-0.04321* (0.0257)	0.01606 (0.0131)	0.01009 (0.0090)
Area per person	0.00636*** (0.0019)	0.00514*** (0.0014)	0.00441*** (0.0012)	0.00242*** (0.0006)
Age at first birth	-0.01022* (0.0059)	-0.00989* (0.0056)	0.00127 (0.0015)	0.00090 (0.0014)
First child is a boy	0.02408 (0.0222)	0.02629 (0.0216)	0.02616** (0.0115)	0.01719* (0.0090)
Partner characteristics: Age				
		-0.00625** (0.0029)		-0.00456*** (0.0016)
Average monthly salary		0.00001 (0.0000)		0.00000 (0.0000)
N	807	807	1650	1650
			1557	1557
				-0.00443*** (0.0014)
				0.00000 (0.0000)
				0.00000 (0.0000)

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 1.6: Estimation results: age interval (continue)

	Age differences			
	LP	Probit	LP	Probit
Policy	0.02782** (0.0115)	0.02706** (0.0107)	0.02546** (0.0115)	0.02558** (0.0107)
Age difference	0.00353** (0.0014)	0.00389** (0.0016)	0.00348** (0.0014)	0.00385** (0.0015)
Education	0.00196 (0.0018)	0.00232 (0.0019)	0.00193 (0.0018)	0.00225 (0.0018)
Average monthly salary	-0.00000*** (0.0000)	-0.00000** (0.0000)	-0.00000*** (0.0000)	-0.00001*** (0.0000)
City	-0.00788 (0.0132)	-0.00566 (0.0120)	-0.01365 (0.0136)	-0.01048 (0.0125)
Area per person	0.00375*** (0.0010)	0.00293*** (0.0007)	0.00369*** (0.0010)	0.00287*** (0.0007)
Age at first birth	-0.00349** (0.0016)	-0.00386** (0.0017)	-0.00379** (0.0016)	-0.00399** (0.0017)
First child is a boy	0.01351 (0.0114)	0.01271 (0.0107)	0.01397 (0.0114)	0.01275 (0.0106)
Partner characteristics: Average monthly salary			0.00000** (0.0000)	0.00000** (0.0000)
N	2179	2179	2179	2179

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 1.7: Estimation results: income categories

	Income category: wage			Income category: income reported		
	LP	Probit	LP	Probit	LP	Probit
Policy	0.02480** (0.0105)	0.02146** (0.0085)	0.02355** (0.0111)	0.01904** (0.0084)	0.02506** (0.0108)	0.02032** (0.0083)
Age	0.02621** (0.0125)	0.04845** (0.0123)	0.02855** (0.0130)	0.04971** (0.0122)	-0.02591 (0.0371)	0.04115 (0.0330)
Age2	-0.00054** (0.0002)	-0.00090** (0.0002)	-0.00052** (0.0002)	-0.00085** (0.0002)	0.00022 (0.0005)	-0.00073 (0.0005)
Education	0.00108 (0.0017)	0.00106 (0.0014)	0.00099 (0.0018)	0.00113 (0.0014)	0.00125 (0.0019)	0.00120 (0.0015)
Income category	0.00008 (0.0002)	0.00004 (0.0001)	0.00013 (0.0002)	0.00007 (0.0001)	-0.00000 (0.0000)	-0.00000 (0.0000)
City	-0.00967 (0.0129)	-0.00941 (0.0101)	-0.00864 (0.0131)	-0.00819 (0.0101)	0.01425 (0.0130)	-0.01361 (0.0133)
Area per person	0.00463** (0.0010)	0.00288** (0.0006)	0.00460** (0.0010)	0.00288** (0.0005)	0.00439** (0.0012)	0.00237** (0.0005)
Age at first birth	0.00013 (0.0016)	-0.00020 (0.0017)	-0.00046 (0.0016)	-0.00096 (0.0017)	0.00120 (0.0015)	0.00086 (0.0014)
First child is a boy	0.02195** (0.0108)	0.01627* (0.0087)	0.01573 (0.0112)	0.01085 (0.0086)	0.02597** (0.0115)	0.01751** (0.0087)
Partner characteristics:						
Age			-0.00448** (0.0014)	-0.00472** (0.0015)		-0.00457** (0.0014)
Income category			0.00002 (0.0001)	0.00003 (0.0001)		0.00000** (0.0000)
N	2312	2312	2179	2179	2312	2179

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .



Table 1.8: Estimation results: income categories (continue)

	Income category: income constructed			Employment status and working hours		
	LP	Probit	LP	LP	Probit	LP
Policy	0.03021*** (0.0109)	0.02576*** (0.0087)	0.02305** (0.0116)	0.02399** (0.0104)	0.02043** (0.0085)	0.02016* (0.0111)
Age	0.02648** (0.0126)	0.04887*** (0.0123)	0.02977** (0.0130)	0.02491** (0.0126)	0.04669*** (0.0123)	0.02775** (0.0130)
Age2	-0.00055*** (0.0002)	-0.00090*** (0.0002)	-0.00053*** (0.0002)	-0.00053*** (0.0002)	-0.00087*** (0.0002)	-0.00050** (0.0002)
Education	0.00157 (0.0018)	0.00143 (0.0014)	0.00125 (0.0018)	0.00101 (0.0018)	0.00103 (0.0014)	0.00088 (0.0018)
Income category	-0.00000** (0.0000)	-0.00000* (0.0000)	-0.00000** (0.0000)	-0.00000** (0.0000)	-0.00000* (0.0000)	-0.00000** (0.0000)
Part-time employment				-0.01129 (0.0150)	-0.01045 (0.0115)	-0.01171 (0.0155)
Hours per week				0.00002 (0.0007)	0.00001 (0.0005)	0.00008 (0.0007)
City	-0.00472 (0.0130)	-0.00459 (0.0098)	-0.01226 (0.0135)	-0.00860 (0.0131)	-0.00902 (0.0102)	-0.01216 (0.0137)
Area per person	0.00467*** (0.0011)	0.00285*** (0.0006)	0.00455*** (0.0010)	0.00489*** (0.0011)	0.00299*** (0.0006)	0.00483*** (0.0011)
Age at first birth	0.00037 (0.0015)	-0.00001 (0.0017)	-0.00074 (0.0016)	0.00071 (0.0016)	0.00028 (0.0017)	-0.00011 (0.0016)
First child is a boy	0.02151** (0.0109)	0.01653* (0.0087)	0.01569 (0.0112)	0.02445** (0.0108)	0.01825** (0.0088)	0.01930* (0.0113)
Partner characteristics:						
Age			-0.00450*** (0.0014)		-0.00458*** (0.0014)	
Income category			0.00000** (0.0000)		0.00000** (0.0000)	
N	2312	2312	2179	2273	2273	2144

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 1.9: Estimation results: type of education

	High school		Technical school	
	LP	Probit	LP	Probit
Policy	0.05266*** (0.0191)	0.04005*** (0.0147)	0.04903** (0.0196)	0.02525** (0.0122)
Age	0.00303 (0.0195)	0.02401 (0.0168)	0.00013 (0.0208)	0.02350* (0.0134)
Age2	-0.00018 (0.0003)	-0.00051* (0.0003)	-0.00004 (0.0003)	-0.00039* (0.0002)
Average monthly salary	-0.00000 (0.0000)	-0.00000 (0.0000)	-0.00001* (0.0000)	-0.00001* (0.0000)
City	-0.02133 (0.0219)	-0.01804 (0.0169)	-0.03233 (0.0223)	-0.02434 (0.0163)
Area per person	0.00367** (0.0016)	0.00210*** (0.0008)	0.00304** (0.0014)	0.00162*** (0.0006)
Age at first birth	0.00309 (0.0026)	0.00240 (0.0027)	0.00218 (0.0028)	0.00197 (0.0022)
First child is a boy	0.02827 (0.0198)	0.02043 (0.0153)	0.03241 (0.0206)	0.01565 (0.0121)
Partner characteristics:				
Age			-0.00666*** (0.0020)	-0.00655*** (0.0017)
Average monthly salary			0.00001*** (0.0000)	0.00000*** (0.0000)
N	738	738	691	691
			748	748
			717	717

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 1.10: Estimation results: type of education (continue)

	University degree			
	LP	Probit	LP	Probit
Policy	0.02183 (0.0191)	0.02282 (0.0152)	0.01734 (0.0204)	0.01962 (0.0150)
Age	0.04491* (0.0256)	0.06790** (0.0277)	0.05632** (0.0268)	0.07306*** (0.0282)
Age2	-0.00082** (0.0004)	-0.00118*** (0.0004)	-0.00089** (0.0004)	-0.00117*** (0.0004)
Average monthly salary	-0.00000*** (0.0000)	-0.00001*** (0.0000)	-0.00000*** (0.0000)	-0.00001** (0.0000)
City	0.01334 (0.0223)	0.01819 (0.0164)	0.00962 (0.0248)	0.01662 (0.0169)
Area per person	0.00548*** (0.0018)	0.00389*** (0.0010)	0.00525*** (0.0019)	0.00364*** (0.0010)
Age at first birth	0.00015 (0.0024)	-0.00026 (0.0028)	-0.00228 (0.0027)	-0.00226 (0.0028)
First child is a boy	-0.00502 (0.0181)	-0.00418 (0.0147)	-0.01505 (0.0192)	-0.00803 (0.0144)
Partner characteristics:				
Age			-0.00657** (0.0028)	-0.00622** (0.0027)
Average monthly salary			0.00000 (0.0000)	0.00000 (0.0000)
N	826	826	771	771

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# Chapter 2

## Parental Leave Policies, Fertility Decisions and Delayed Motherhood: Evidence from Germany

### 2.1 Introduction

A remarkable decline in birth rates is a prominent pattern of the socioeconomic life of developed European countries over the last decades. According to Eurostat, the total fertility rate in the European Union <sup>1</sup> was 1,541 in 2009 which is significantly lower than the replacement level 2,1<sup>2</sup>. The negative consequences of such demographic trends and possible government intervention to stabilize the situation were widely discussed in the literature. The political movement resulted in the establishment and development of family-friendly policies to maintain the balance between work and family life. Such countries as Germany, France, Norway and Sweden explicitly proclaimed pro-natalist policies while others, such as USA, Canada, Switzerland, and Netherlands implemented a system of subsidies targeted at families with a new-born. The common target of such policies is to stimulate fertility. In general, family policies try to relieve economic constraints a woman faces in motherhood decisions. They allow partners to reallocate time between labour participation and family responsibilities. The side concerns might be different: demographic burden on the social security system, employment discrimination of mothers, child welfare, etc. Depending on the goals the implementation can be via different channels and policy effectiveness can significantly vary given the institutional context. In general, a system of family support mainly consists of the following elements:

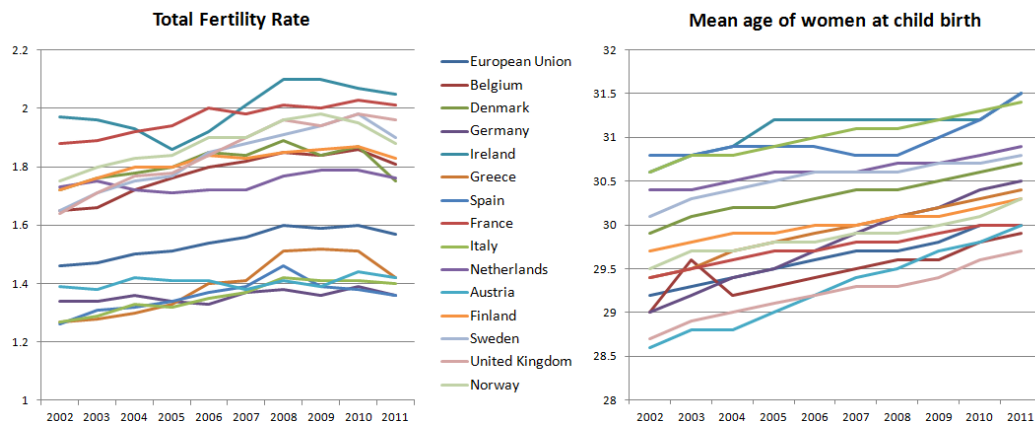
- maternity leave: duration and payment;
- parental leave: duration and payment;
- child care: public or private provision;
- lump-sum payments on the birth - maternity grant;

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<sup>1</sup>Total fertility rate is an average number of children that a woman might have during her lifetime.

<sup>2</sup>According to the United Nations definition

Figure 2.1: Fertility dynamics



Source: WDI, Eurostat.

- system of tax allowance;

Different types of implemented family policies might potentially stimulate fertility decisions either directly or indirectly. However, policy implementation might have an ambiguous impact on the fertility outcomes if the system of family support lacks some institutions. The empirical evidence of reproductive behaviour response to the implemented policy is mixed, while the price of such government intervention is relatively high. In the following analysis I consider German family support and discuss the parental leave system that became a key element in the 2007 German reform.

German population dynamics follows the developed countries pattern facing the problem of low fertility rates as Figure 2.1 shows. While France, Norway and Sweden report positive birth dynamics achieving the reproductive level, German birth rates are consistently low - 1.3 birth per women - given the equal mean age at child birth around 30 years old. In the German case, the mean age coincides with an age at first birth, in 2008 the average age of a woman at first child birth was around 30 years.<sup>3</sup> The stagnation in the negative trends of reproductive dynamics looks puzzling in a country with a generous system of pro-natalist support. According to the study conducted by the Kiel Institute, the German government finances more than one third of child costs. In 2004, Germany expenditure on family and child benefits amounted to 10.5% of total social expenditures which is above the EU average of 7.8%. Thus, the existing system of German family support could be defined as both generous and expensive. At the same time, Germany has been characterized by low fertility rates and low maternal labour force participation. To overcome these trend, in 2006 the German government announced the reform of the parental leave system. The targets were to increase fertility rates and maternal employment. The reform substantially raised the amount of parental leave benefits and shortened the period of payment.

The objective of this paper is to test whether the introduced parental incentives have an impact on fertility intentions of German couples. Based on the previous findings of the literature, I focus on the heterogeneous female responses across different parity<sup>4</sup> groups.

<sup>3</sup>United Nations report [http://w3.unece.org/pxweb/database/STAT/30-GE/02-Families\\_households/?lang=1](http://w3.unece.org/pxweb/database/STAT/30-GE/02-Families_households/?lang=1)

<sup>4</sup>Hereinafter, I define parity as a birth rank

For childless couples I expect no significant response to the introduced incentives. For couples with one child the reform might have a positive impact allowing to complete fertility. I focus on females who have been employed around the time to decide to conceive, because the parental leave reform produced higher variability across their financial incentives. To estimate the effect of the reform I use the German Socio-Economic Panel data for the period 2001-2010, exploiting variation in individual and household characteristics. Recent findings suggest that the lack of access to the child-care facilities in Germany depresses fertility. To account for child-care availability, I use regional data on public child-care provision.

The empirical findings indicate the significant shift in the birth plans associated with the implementation of the reform. The probability of entering motherhood among childless couples has dropped to 11.7 percentage points. The couples that already have one child are more likely to have a second and the probability has increased by 7.7 percentage points. The effect persists only for full-time employed women. It slightly varies across age for a second birth - higher for younger cohorts. Even if the estimation results might capture some underlying processes in the German society, they still provide evidence of the indirect effects created by the reform in the short-run. The positive effect of the financial incentives introduced is consistent with previous findings on the effectiveness of parental leave to stimulate higher birth parities. The negative impact might be related to the greater uncertainty a woman faces on entering motherhood. A restricted child-care supply might create a postponement effect that cannot be simply compensated by the monetary benefits.

The paper is organized as follows. Section 2 provides an institutional background of the German family policy and the introduced incentives and summarizes the main findings in the literature relating to the incentives introduced. The empirical strategy, main hypothesis and data description are presented in Section 3. Section 4 presents the estimation results. Section 5 provides conclusions and future research directions.

## **2.2 Parental leave: institutional background and empirical evidence**

The following section discusses the empirical findings on the parental leave reforms introduced in different European countries. It provides an institutional background of German policy regarding family support and child-care provision.

### **2.2.1 Parental leave reforms in the European context**

All the introduced incentives are based on the main assumption that money and time are the main constraints a woman faces in her fertility decision. The costs might be generalized as

- loss in income,
- career interruption;

- human capital depreciation;
- opportunity costs.

There is relatively broad literature studying the effect of parental leave policies on labour market outcomes and child-care provision for mothers with new-borns<sup>5</sup>, Thévenon and Gauthier (2011), fewer studies focus on the effect of parental leave policies and fertility. The empirical evidence on the success of such policy instruments for stimulating fertility is mixed. Thvenon (2009) documents the polarization of labour supply behaviour: full-time employment is strongly associated with women without children while part-time employment is closer linked to having children. Summing up, the empirical findings of the current literature Gauthier (2008) emphasizes that the financial support introduced in parental-leave policies might have a restricted impact depending on income threshold or a certain amount of allowance.

Scandinavian countries are usually refereed as a successful example of the positive impact of parental-leave reforms on total fertility rates. The specific characteristic of Nordic policies is that they support women's employment and men's involvement in childcare. In general, the empirical finding confirms that the increase in the leave allowance and the payment period decreased the birth spacing. Björklund (2006) examines completed fertility patterns for Swedish women born in 1925-1958. He applies difference-in-difference strategy using various European countries with less developed family policies as a control group. The empirical findings suggest that the extension of maternal support has a positive impact on the fertility dynamic in Sweden. The study by Neyer and Andersson (2008) confirms the positive impact of parental-leave allowance on the subsequent births. Using Swedish data they document the reduction in birth spacing in the 1980s. The introduced incentives also minimized the differences in fertility behaviour across education groups. Walker (1995) analyses the impact of public policies on the price of fertility in Sweden. He considers parental leave benefits as a source to reduce foregone earnings of the parents. His findings confirm a positive effect of such reduction on the price of fertility. However, the effects are smaller compared to larger and negative effects of trends in female wages and return to human capital. Ronsen (2004) considers the effect of parental leave expansion on fertility by comparing Norway and Finland. Using micro-data on the Family and Fertility Surveys, she estimates the probability of conception for different parities. In Finland, the parental leave policy has a positive significant impact on the probability of second birth, while there is no significant effect in the case of Norway.

The heterogeneous impact of financial incentives on the birth order confirms various studies using micro and macro data. Laroque and Salanie (2008) address the problem of estimation the quantitative impact of financial benefits on fertility. They suggest an empirical strategy based on comparing the fertility outcomes of women with similar characteristics except for their wage and the wage of the partner. Using variation in financial incentives, the authors show the sensitivity of fertility decisions to financial incentives in the case of first and third births. Using Hungarian aggregated data Gábos *et al.* (2009) finds that the child-related benefits increase the birth parity.

Another example of the parental-leave effect on the fertility decisions is Austrian parental-leave reforms introduced in the 1990s. Lalive and Zweimller (2009) study

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<sup>5</sup>For a detailed review see Gauthier (2007)

the effect of changes in Austrian parental leave legislation on fertility and work responses. The 1990 reform extended the paid parental leave period up to two years, while the 1996 reform reduced it by deducting the last six months. Using Austrian social security data, the authors estimate the effect on the probability of return-to-work and a higher-order birth. The difference-in-difference estimation results confirm a strong effect of parental-leave rules on mothers' subsequent fertility behaviour. The fertility increases by 5 percentage points not only in the short run (within three years), but the effect persists in the long run. They also demonstrate the negative impact of the leave duration on mothers' return-to-work.

The availability and price of childcare are important factors to maintain the work-family balance. It decreases the opportunity costs of career interruption and could thus influence fertility decisions. Cross country comparisons show that birth rates are higher in case of higher woman labour force participation, access to childcare provision and lower childcare costs (Del Boca and Locatelli (2008) , D'Addio and D'Ercole (2005)). Note that the empirical findings potentially might have an endogeneity problem. In the case of public childcare, there is an additional source of endogenous effect since the availability of public child-care services and their price might be a choice variable in response to parents' demand.

Using the exogenous variation in child-care fees created by the Swedish Child Care Reform, Mörk *et al.* (2013) find that anticipated reduction in childcare costs increased the number of first and higher-order births. However, the observed increase in fertility is a result of timing effect, when families have an additional child slightly earlier than planned. The estimation results do not confirm any statistically significant income effects on fertility behaviour induced by the reform. Using Norwegian register data, Rindfuss *et al.* (2007) find significant positive effects of availability of day care for children under three on the transition to motherhood. Del Boca (2002) analyses a model of labour supply and fertility in the Italian context. The estimation results show that the availability of childcare and part-time jobs increase both the probability of having a child and returning to work.

There are a relatively high number of studies estimating the effect of parental-leave incentives on the maternal employment and child-care outcomes in the case of Germany. However, fewer studies focus on the impact of parental-leave benefits on the fertility decision. Buttner and Lutz (1990) considers the introduction of paid leave up to the first child birthday for a working mother with two and more children in the German Democratic Republic during the 1970s. The authors find a significant positive effect on the second and third birth which remains in the long-run. Hofmann and Hohmeyer (2013) show that perceived economic uncertainty at the beginning of the 2000s created a postponement effect in fertility among German couples. Haan and Wrohlich (2011) introduce a structural model of female employment and fertility to estimate the effect of financial incentives. The model calibration is based on the German Socio-Economic Panel data for the period 2000-2006. Their findings confirm that the employment-related financial incentives for employed women create small changes in fertility incentives. On the contrary, the child-related financial incentives provide positive and significant fertility effect. In addition, women without children exhibit a higher probability of giving birth.



### 2.2.2 German system of family support: institutional background

For a long period of time, Germany implemented a complex family policy system targeted at maternity protection and child-rearing oriented towards the "breadwinner" model. Initially, the support system was aimed at working mothers who were provided with maternity leave and job protection. From 1986, the parental leave system was introduced and fathers became entitled to leave. In addition, the working criteria were abolished. In spite of the formal support of the father's enrolment in child rearing, a breadwinner husband and part-time carer mother model has become the typical arrangement for couples with young children (Schober (2012)). The failure of such a pattern to stimulate fertility and maternal employment has moved policy focus to "dual-earner" household. Child rearing as a traditional maternal activity thus becomes the responsibility of the private or public child-care institutions.

Currently, the benefit system for a mother with a new-born consists of maternity leave benefit, parental leave benefit, child benefit, child tax allowance and additional household benefits based on the number of children. The benefits are almost universal in Germany. The eligibility criterion is German or European citizenship, a settlement permit or a residence permit with at least three years past employment in Germany.

The maternity leave system was established in 1986 and has not changed significantly afterwards. It consists of a leave period of 14 paid weeks, which is typically divided into 6 weeks before childbirth and 8 weeks afterwards. During the maternity protection, mothers are not allowed to work but are insured against dismissal. They also receive maternity benefit (Mutterschaftsgeld), which is a net government transfer up to 13 Euros per day and additional coverage equal to the net income if the woman is eligible for social insurance. The category of employed women without government insurance receives a one-time maternity allowance of up to 210 Euros and supplements from the employer.

In addition, there are a number of child-related allowances. The parents receive an untaxed allowance (Kindergeld) until the child's 18th birthday. For the first and second child, it consists of 184 Euros with a slight increase for a third child - 190 Euros and 214 Euros for each offspring thereafter. The parents can deduct part of the income necessary to maintain a child from their tax return. Low-income households<sup>6</sup> can further apply for in-work tax credit (Kinderzuschlag) up to 140 Euros per month for 6 months. Parents may also be eligible for the accommodation allowance (Wohngeld) in the form of home-ownership subsidies for low-income families with a higher number of children.

The German child-care system represents a universal mixed-market provision by public institutions and different types of non-state providers (religious institutions, private non-profitable organizations, commercial day-care centres) and private sector provided by nannies, child-minders or family day-care. The public centres are under municipality or local-authority control, while private non-profitable units mainly belong to welfare organizations. Child-care facilities run by churches are part of the public market. The owners of commercial centres are entrepreneurs or companies providing child-care

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<sup>6</sup>Income up to 900 Euros per couple or 600 Euros per single parent

services for employees. In 2009, the survey “Children and Personnel in Child-Care Centres”<sup>7</sup> reports that public centres provided 34% of total market share, churches covered 36% of the market, while the non-profitable centres operated by non-public institutions represented 28% of the market share. The proportion of commercial centres was significantly low - around 2%. The peculiar characteristic of the child-care market is that all the other categories are eligible for public finance apart from the public institutes run by public authorities. Therefore the German child-care market can be defined as highly state-dependent.

An additional important feature of the German market is price rationing. The local communities who finance and run the majority of public child-care institutions set the fees based on the household income and the child’s age<sup>8</sup>. The price of subsidized slots is relatively low and the following numbers are reported for children under three years old. In 2005, for children under three years old the parents monthly fees on average were 100 Euro for a part-time slot and 120 Euro for a full-time slot while public expenditures were around 700 Euro per month per child (Borck and Wrohlich (2011)). Privately provided child care comes at a considerably higher cost, around 5-6 Euro per hour (Haan and Wrohlich (2011)). Thus, for families who do not have access to a subsidized child care slot, the price of care substitution is relatively high.

Since public childcare is relatively cheap there is a high demand for slots. It is accompanied by low availability and high heterogeneity across East and West Germany, in particular for children under three years old. Haan and Wrohlich (2011) summarize that public child-care slots were available only to 8% of this age category in Western Germany in 2006, while it stood at 40% in Eastern Germany.<sup>9</sup> Wrohlich (2008) provides empirical evidence of considerable excess demand for subsidized childcare across the country. Muehler (2010) shows that the largest part of the West German market is served by non-profitable organizations while municipal public institutions are more typical for the East. The additional heterogeneity comes from the distribution of child-care providers at regional level. Therefore the child-care supply might contain systematic differences by region or by parental preferences regarding the type of child-care provider. However, the results from Muehler (2010) confirm that non-profitable and commercial centres serve a substantially higher share of full-time childcare for children under three years old compared to public providers even if the regional factor and provider distribution are controlled. Therefore higher availability of public day-care institutions and longer opening hours may allow East German mothers to outsource some of the childcare.

### 2.2.3 German parental leave reform 2007

The main component of the family support is the system of parental leave. It was established in 1986 and underwent changes during the 1990s, when the length and parental allowance were increased. The carer was entitled to parental leave of up to

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<sup>7</sup>The data is a part of annual Child and Youth Welfare Survey collected by the German Federal Statistical Office

<sup>8</sup>The privately subsidized institutions use a similar scheme.

<sup>9</sup>East Germany inherited the child-care system from the former German Democratic Republic where the family policy stimulated maternal employment.

three years (Elternzeit) if the person stayed at home or worked less than 19 hours per week. Two important reforms in 1998 and 2001 adjusted the existing regulation to the needs of employed parents introducing further choice and flexibility in take-up to stimulate return-to-work behaviour of mothers. From 1998, parents had the option of increasing the parental allowance to 450 euros per month if they reduced the benefit period to one year. From 2001, both partners could share job-protected parental leave simultaneously. The reform 2001 also raised the threshold of part-time work during the leave period from 19 hours to 30 hours per week<sup>10</sup>(Bundesministerium fr Familie 2002, 2006).

The carer received the child-rearing benefit (Erziehungsgeld) that was a universal means-tested transfer with an income ceiling (30,000 Euros for the first six months and 16,500 Euros afterwards for a married couple<sup>11</sup> ). The eligible period was two years and the payment was 300 Euros per month. If the income threshold was exceeded, the benefit was withdrawn at 63% rate. Thus, the child-rearing benefit depended on the gross income of the household and the maternal labour participation decision. Under the old regulation, the beneficiaries were therefore low-income families as the income threshold and the amount made payment negligible for middle and high-income households.

Negative trends in reproductive behaviour and low rates of return-to-work for mothers with young children<sup>12</sup> initiated the further reforms of the parental leave system. As it is discussed by Spiess and Wrohlich (2008), the main idea of the 2007 reforms was to provide an institutional support for mothers' employment changing the existing system towards the Scandinavian model of the "dual-earner household". There was a belief in the German political debate that the Scandinavian model with a high supply of publicly-funded day-care and generous parental leave promotes higher employment rates among mothers with young children and higher fertility rates by reducing family income losses after childbirth. The new system was established at the end of 2006 and started to be applicable for children born after 1 January of 2007.

The main changes of the reform are related to the length and amount of leave payment. Under the new system, the means-tested benefits are replaced by the parental allowance (Elterngeld) which accounts for 67% of the rearing-parent labour net income per month. The sum is at least 300 Euros and at most 1800 Euros. The replacement rate increases to 100% in the case of the rearing parent net income being under 1000 Euros per month. Another important change is the cut-off in the duration payment period. The parental allowance is granted for 14 months of joint duration that means both parents share the child-rearing period and only for 12 months in single-carer case. To sum up, the new parental leave system became more generous but for a shorter time-period.

According to the public discussion, the reform sought to

- stimulate fertility through compensating the decline in household income in the first year of motherhood
- support maternal return-to-work

<sup>10</sup>It is equivalent to the reduced full-time job in Germany

<sup>11</sup>These thresholds were applied from 2004 onwards and they had previously been 51130 Euros per year per married couple

<sup>12</sup> For instance, 48% in Germany compared to 77% in Sweden , OECD 2006.

- increase fathers' participation in childcare.

As discussed in Bergemann and Riphahn (2011), the standard labour supply models predict the positive impact of the policy on female labour force participation. The increase in amount of benefits and decline in the paid period create sizeable income decrease creating a strong incentive to maintain the household income level by returning to work. However the heterogeneity of the response might be observed depending on the prior labour income. Under the old system in Germany, the difference in terms of parental leave between high and low-income mothers was smaller than under the new one.

Note that there is no clear impact of the reform on household fertility decisions. On the one hand, the female direct and opportunity losses decrease through the income effect discussed earlier. However, the positive impact of a policy would preserve if and only if female preferences are towards continuing labour-force participation, i.e. the utility of consumption through increasing income is higher than the utility of rearing children. The other effect of the reform is related to the negative incentive for new mothers to plan additional children or give birth to planned children more quickly as it is biologically difficult to have children within one year.

The excess of demand on child-care provision creates the barrier for successful implementation of the reform. To return to work a mother needs a substitution for her child-care provision. Since the private child-care sector is considerably expensive and it cannot be regarded as an alternative to the public sector, a woman faces an important constrain making the decision regarding her fertility and labour participation decision. Using a life-cycle model Bick (2011) evaluates the impact of subsidized childcare on fertility and employment participation decisions. The counterfactual policy analysis suggests that the lack of access to subsidized childcare reduces fertility.

A possible solution is informal child-care arrangements. Hank and Kreyenfeld (2003) compare the effect of formal and informal care arrangements on the transition into the motherhood. Their findings suggest that the possibility of informal childcare significantly increases the probability of first birth, but there is no effect of the availability of publicly provided child-care on fertility. Wagner (2012) confirms these findings showing that the access to informal networks increases the probability of maternity employment. However, the level of informal arrangements is relatively low in the case of Germany. In 2008, the informal arrangements were 14,5% comparing to the EU average 23,7%<sup>13</sup>.

Few studies consider the 2007 parental leave reform and its impact on maternal employment and fathers' enrolment in childcare. Using a micro-simulation model for Germany Spiess and Wrohlich (2008) show that the wage-dependent parental allowance increases the rate of labour market participation for a second year of motherhood. To estimate the effects of the reform, Kluge and Tamm (2009) and Bergemann and Riphahn (2011) use a "natural" experiment approach arguing that the reform introduction was not anticipated by a peculiar population group. Using survey data collected by health insurance funds in two federative states, Kluge and Tamm (2009) find a significant decrease in employment probability during the first 12 months of motherhood. The results differ for the expected employment status in the second year of motherhood where the prob-

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<sup>13</sup> OECD (2011)

ability of labour participation increases. Following the same identification strategy for the different German household panel dataset, Bergemann and Riphahn (2011) show the positive effect of the German parental leave reform on the mothers' intention to return to work. Comparing structural and experimental approaches, Geyer *et al.* (2012) use German micro-census data to analyse the employment effects. As in previous studies, the authors find a significant decline in maternal part-time employment during the first year. The overall changes in participation during the second year of the motherhood are insignificant. Chirkova (2012) shows that the policy has a significant negative effect on the employment breaks related to motherhood. The effect persists both for the first and second years of child rearing, amplifying for mothers with a regular part-time job. Using micro-simulations, Haan and Wrohlich (2011) conclude that child-care subsidies conditional on maternal employment status should increase the maternal ratio of return-to-work. In the paper by Bick (2011), counterfactual policy analysis shows that insufficient subsidies for child-care provision decrease labour participation for mothers with children under three years old. Geisler and Kreyenfeld (2012) find the significant increase in parental leave usage. Schober (2012) finds a significant increase in fathers' involvement in childcare by analysing allocation of child-care time within the couple. To the best of my knowledge there is no paper discussing the short-run effect of the 2007 parental leave reform on a woman's birth decision.

## 2.3 Empirical Strategy and Data Description

### 2.3.1 Estimation methodology

The purpose of the study is to identify whether the 2007 reform has any impact on women's fertility decisions in the short-run. Since the literature discussed earlier provides empirical evidence of the heterogeneous response across birth order, I consider the decision for the following different parities:

- females who decide to enter motherhood
- females who decide to have a second child

I assume that women have anticipated changes when making their conception decisions. The reform had been widely discussed in the media and rapidly approved by the parliament <sup>14</sup>.

I examine fertility decision within the static quantity-quality (Becker *et al.* (1960), Willis (1973)) framework. Children are considered as a durable consumption good - a source of income and satisfaction. The utility associated with children can be defined through a system of parents' preferences. Parents maximize utility from their consumption, leisure and a number of children on a set of time and money constraints. There are two group of costs associated with children: direct costs (expenditure on rearing, education etc.) and opportunity costs (income losses during the leave period, human

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<sup>14</sup>I exclude women with new-borns in January, February and March 2007 because they potentially were not aware of the changes introduced (the reform discussion was initiated later). Women with a child born in December 2006 are also excluded, Neugart and Ohlsson (2013) found the empirical evidence of birth shifting towards January 2007 when the new parental system came into force

capital depreciation and missed career opportunities). In static quantity-quality model the increase in parental-leave allowance might decrease the direct expenditure and opportunity costs in terms of earnings. However, a shortened period of paid parental allowance leaves a woman facing the problem of childcare substitution. Given the market structure of childcare in Germany, the costs of an outside child-care provision can be higher than the introduced compensation. Therefore, she might extend her parental leave inducing the direct income losses and opportunity costs of the longer career interruptions. Summing up the effect of the introduced changes might be ambiguous.

I consider an employed female decision about her fertility in each time period, i.e. she maximizes the household utility conditioning on her labour participation. To avoid the problem of household bargaining (Haan and Wrohlich (2011)), I assume that the partner takes the decision as an exogenous, i.e. she maximizes the household utility conditioning on her partner's behaviour. Therefore, at given date  $t$  for the household  $i$  the female choice is  $F_{it} = 1$ , if she decides to have a child in a subsequent period. Notice that the net household income varies on the outcomes:

- a woman works, no birth occurs.
- a woman does not work, birth occurs.

The estimation is aimed at capturing the changes in maternity incentives responding to the introduced financial incentives. The variable of interest is a fertility decision  $F_{it}$ , binary outcome equal to 1 if she gave a birth at the period  $t$ , 0 if the child birth does not occur. Let  $D_{it}$  indicate a mother's treatment status, where  $D_i = 0$  if she was making her conception decision under the old regime, and  $D_i = 1$  under the new ones.

The empirical advantage of the 2007 reform is that it has created significant variability in household financial incentives. First, the allowance has increased across all income groups: the lowest payment under new system is equal to the highest payment under the old system. Second, the low-income household might have because variation in the amount of monthly payment is relatively low while the period is significantly shortened (one year less). On the contrary, households with higher labour income experience larger benefit gains. Therefore the reform might create non-linear response in fertility decisions of various family groups. I consider the following hypotheses:

- the reform increased the probability of a birth;
- it had a higher positive effect for families with higher labour income, and a negative effect for low-income families;
- it had an impact on women with higher education/income;

The birth probability is defined by the socio-economic characteristics at individual, household and regional level. There is natural time interval between pregnancy and delivery, so the characteristics of a previous period would define the birth outcome in the current period. As I have already seen, the availability of childcare is a significant factor in mothers' after-birth decisions. I include a child-care variable to see whether women make fertility decision anticipating the child-care supply. I also account for a potential effect of future flow of parental benefits through labour income, because an amount of allowance depends significantly on the labour income of the preceding year

under the new system. The estimation equation is following:

$$Pr(F_{it} = 1 | controls) = \beta_0 + \beta_1 d_i + \beta_2 d_i labourincome_{it-1} + \beta_3 childcare_{it-1} + \sum_{i=5}^k \beta_i X_{1it-1} \quad (2.1)$$

where  $F_{it}$  is the birth delivery at period  $t$ ;  $d_i$  is a policy indicator;  $income_{it-1}$  is a labour income in the preceding year;  $childcare_{it-1}$  is childcare availability in the state when she lives.

Following Laroque and Salanie (2008), the identification relies on a variation in financial incentives induced by parental leave reform, a variation in the partners labour income and housing conditions. I exploit regional variation in the child-care facilities. The comparison group consists of females making their conception decision before 2007 and the treated group - mothers with decisions regarding conception after 2007. The estimation identifies whether the reform has an impact on the birth timing controlling for other socio-economic characteristics. I use information on mothers' characteristics only in the period before birth ( $t - 1$ ) exploiting the variation of individual decisions in cross-sectional dimension, controlling for time effects.

### 2.3.2 Data and descriptive evidence

The empirical analysis is based on the German Social Economic Panel (SOEP) data which is longitudinal household survey collecting the information on demographic, income and labour market variables from the representative sample of German private households<sup>15</sup>. It currently covers around 12,000 households, 22,000 adult respondents and 5,000 children living in the surveyed households.

To analyse the effects of the parental leave reforms on the fertility decision, the SOEP provides detailed information about household characteristics and labour incomes in the preceding period. The date of birth (month and year) together with an interview date (month and year) allows me to identify when the information is reported around the conception period<sup>16</sup>. The retrospective analysis of the household members composition together with information about new-borns identifies the number of biological children for a particular woman. I exclude households with three and more children for the purpose of analysis. The observational unit is the birth of a child. Women with the births of siblings during the period of interest are treated as separate observations<sup>17</sup>.

I focus on households consisted of married or cohabiting employed women. Since the ultimate reform related with family policy took place in 2000, I analyse fertility decisions during the period 2001-2010<sup>18</sup>. I assume that there was no significant variability in the household decisions to have children through the government policy. The dataset is constructed using ten waves for 2001-2010. The total sample consists of 3420 women in their reproductive age 20-40, who gave birth to 588 offspring within the considered

<sup>15</sup>For more detailed information see Wagner *et al.* (2007).

<sup>16</sup>The questionnaire covers such issues as time of pregnancy.

<sup>17</sup>Women who gave birth to twins are treated as a single unit.

<sup>18</sup>The information on 2011 will be released in April 2013.

period (17.2%). For a group with parity equal to one 42,7% of birth occur after the reform, while for a group with parity equal to two - 54,2%.

Since the main focus of the analysis is a fertility decision, I follow each mother up to the birth occurring. Females who do not have a birth are observed for the whole period of interest. A woman leaves the sample after her 40th birthday. Monthly information on employment, periods of maternity leave and month of the birth of the child allows me to identify the explanatory variables around the decision of when to conceive. Since the minor part of the sample is unemployed at the time of conception (around 5%), I consider only employed women. To account for the effect of different job-type, I construct the following categories:

- a woman is full-time employed;
- a woman is regularly part-time employed.

To account for the child-care availability constraint discussed above, I construct the variable which represents the ratio of children under three in formal childcare to the total number of children under three in the region<sup>19</sup>. I also control for regional dummies. For personal characteristics, I consider the age, education, partnership status, employment status and individual labour income before the birth<sup>20</sup>. If a partner lives in the household, I include his personal characteristics and income.

The main summary statistics of the variables are presented in Tables 2.1 and 2.2 . The explanatory variables are measured at the last employment spell prior to the birth.

First, consider the females who make their decision to enter motherhood (Table 2.1). I observe significant differences between mothers who give birth in the pre and post reform periods. The females who entered motherhood after 2007 are older, with a higher number of years in education. They have higher labour income. In terms of partner characteristics, the only significant difference is education, as fathers are more educated after the reform. Women who decided to stay childless in the period in question have significant differences in age and education. After 2007, they also have better access to child-care facilities. Their partners are older and better educated. In general, women, who decided to enter motherhood in the period 2001-2009, do not show significant differences when compared to the childless women.

For the group of parity two (Table 2.2), females that make a decision to have a second birth look similar in their socio-economic characteristics. The only difference is a significant increase in the birth spacing between first and second children: it increases almost by a year for the post-reform group. Among the females, who decided to remain with one child, the post-reform group is older, has higher education and works more on part-time jobs. Their partners are also older and have higher labour income. For the whole period of 2001-2009 mothers, who decided to have a second child, are younger, actively participate in the labour market (less part-time employed) and have higher

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<sup>19</sup>The calculations are based on the German administrative childcare (“Statistik der Kinder- und Jugendhilfe”) and population (“Bevölkerungsstand: Bevölkerung nach Geschlecht und Altersgruppen”) data for 2006.

<sup>20</sup>The income variables are adjusted to the 2006 base using consumer price index provided by the SOEP.



Table 2.1: Descriptive statistics: parity 1

	Women with a first child		Women with no children		Mean test	Within period comparison	
	Before 2007 (1)	After 2007 (2)	Before 2007 (3)	After 2007 (4)		(1)-(3)	(2)-(4)
Personal characteristics							
age	29.04 (4.238)	30.59 (4.336)	28.89 (4.626)	30.36 (4.466)	1.46905*** (0.20716)	-0.15220 (0.390)	-0.23320 (0.417)
education	12.92 (2.289)	14.07 (2.786)	12.84 (2.436)	13.65 (2.681)	0.80644*** (0.12002)	-0.07271 (0.210)	-0.42407 (0.259)
employment part-time	0.152 (0.361)	0.126 (0.333)	0.198 (0.399)	0.170 (0.376)	-0.02787 (0.01763)	0.04564 (0.034)	0.04423 (0.035)
household income	58598.0 (29374.9)	61549.1 (27261.0)	54324.6 (27274.5)	56590.3 (26238.7)	2265.66716* (1219.48383)	-4.273e+03* (2360.349)	-4.959e+03** (2465.912)
labour income	24706.5 (13117.3)	28004.0 (13598.6)	24308.2 (14726.5)	24959.2 (13580.0)	651.02583 (645.31340)	-398.24268 (1236.991)	-3.045e+03** (1271.807)
boy1	0.451 (0.499)	0.591 (0.494)	0.139333** (0.05872)				
child care coverage	0.216 (0.154)	0.216 (0.154)	0.177 (0.132)	0.196 (0.140)	0.01911*** (0.00624)	-0.03891*** (0.012)	-0.01960 (0.013)
Partner characteristics:							
age	32.68 (6.075)	34.08 (4.968)	32.26 (5.814)	33.71 (5.967)	1.45560*** (0.297)	-0.4253 (0.540)	-0.3701 (0.595)
education	12.47 (2.594)	13.39 (2.825)	12.49 (2.324)	13.16 (2.668)	0.66730*** (0.128)	0.0144 (0.221)	-0.2325 (0.274)
employment	0.756 (0.431)	0.819 (0.387)	0.732 (0.443)	0.737 (0.441)	0.00441 (0.020)	-0.0238 (0.038)	-0.0822** (0.041)
employment part-time	0.0183 (0.134)	0.00787 (0.0887)	0.0192 (0.137)	0.0248 (0.156)	0.00562 (0.007)	0.0009 (0.012)	0.0169 (0.014)
labour income	34848.4 (19629.6)	35757.6 (18127.0)	31473.0 (17906.5)	32946.3 (18310.5)	1473.29047 (930.334)	-3375.4061* (1729.861)	-2811.3042 (1871.205)
N	291	291	1961	1961	1961	997	1255

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 2.2: Descriptive statistics: parity 2

	Women with a first child		Women with no children		Mean test		Within period comparison	
	Before 2007 (1)	After 2007 (2)	Before 2007 (3)	After 2007 (4)	(3)-(4)	(1)-(3)	(2)-(4)	
Personal characteristics								
age	28.77 (3.742)	28.79 (3.808)	30.25 (4.330)	32.83 (4.324)	2.57456*** (0.21100)	1.47887*** (0.513)	4.03754*** (0.491)	
education	13.39 (2.505)	13.40 (2.339)	12.78 (2.300)	13.18 (2.507)	0.40144*** (0.11825)	-0.61155** (0.282)	-0.22245 (0.293)	
employment part-time	0.0933 (0.293)	0.129 (0.338)	0.348 (0.476)	0.492 (0.500)	0.14432*** (0.02370)	0.25445*** (0.056)	0.36270*** (0.056)	
household income	69248.7 (32486.4)	59044.8 (24538.7)	53515.7 (25949.1)	53832.7 (27538.9)	316.96076 (1297.52650)	-1.573e+04*** (3157.600)	-5.212e+03* (3128.809)	
labour income	30468.2 (15735.4)	27549.0 (14232.4)	21955.6 (13421.9)	20279.3 (12488.4)	-1.676e+03*** (643.42631)	-8.513e+03*** (1623.969)	-7.270e+03*** (1460.316)	
boy1	0.493 (0.503)	0.447 (0.500)	0.516 (0.500)	0.496 (0.500)	-0.01914 (0.02438)	0.02222 (0.060)	0.04935 (0.057)	
age at first birth	29.33 (3.765)	29.43 (3.863)	28.60 (4.611)	28.22 (4.519)	-0.37630* (0.22304)	-0.73008 (0.545)	-1.21083** (0.512)	
boy2	0.507 (0.503)	0.600 (0.493)	0.09333 (0.07886)					
birth interval	2.426 (0.676)	3.366 (1.277)	0.94013*** (0.16474)					
child care coverage	0.193 (0.150)	0.185 (0.132)	0.201 (0.150)	0.212 (0.160)	0.01110 (0.00752)	0.00757 (0.018)	0.02653 (0.018)	
Partner characteristics:								
age	31.72 (3.849)	30.81 (4.093)	33.50 (5.825)	36.44 (5.460)	2.94470*** (0.294)	1.7751** (0.718)	5.6342*** (0.656)	
education	13.76 (2.952)	13.60 (2.822)	12.31 (2.465)	12.54 (2.548)	0.22841* (0.130)	-1.4432*** (0.318)	-1.0558*** (0.323)	
employment	0.867 (0.342)	0.824 (0.383)	0.802 (0.399)	0.808 (0.394)	0.00567 (0.019)	-0.0646 (0.047)	-0.0158 (0.045)	
employment part-time	0.0267 (0.162)	0.0471 (0.213)	0.0226 (0.149)	0.0230 (0.150)	0.00034 (0.007)	-0.0040 (0.018)	-0.0241 (0.018)	
labour income	38084.1 (18647.6)	33006.8 (15266.8)	33409.5 (19914.3)	35618.9 (22579.2)	2209.41885** (1108.266)	-4674.5596* (2527.908)	2612.1709 (2771.672)	
N	160	160	1758	1758	1758	1136	782	

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

labour income.

The preliminary analysis shows that women making their first conception decision do not show significant differences in socio-economic characteristics. For females with a second child decision the situation is different. They are younger and more active on the labour market. It contradicts the German dominated idea that the women who decided to have children are less related to the labour market. There might be some persistent selection into “two-child” model in terms of education/employment characteristics during the period in question. It is important to note that I also do not observe any significant difference among the women for both parity’s groups, who conceived before and after the reform implementation. Since the birth interval increased among the women with parity two, I can expect that the reform has a significant effect on mothers who have been postponing the second birth. For the women with a first birth, the reform might shift the decision of higher educated / higher income groups.

## 2.4 Estimation results

The model 2.1 presented in Section 3 is estimated using the linear probability and probit specifications. The baseline estimation includes main socio-economic characteristics of a mother at the time regarding the decision to conceive: her age and education, type of occupation and reported labour income. I control for a child-care coverage in the region of dwelling location. Since it is established in the literature (see Blackburn *et al.* (1993)) that age at birth follows a bell-shaped curve, I consider a quadratic specification of age function. Following Bratti and Tatsiramos (2011), for a parity two I include an age at first birth to control for the effect of delaying motherhood on the transition into second birth. I include a first child’s gender to account for a possible bias in parental preferences of children sex composition<sup>21</sup> I also control for a mother’s age at first birth. I estimate different specification including policy interaction terms. Tables 2.3 and 2.4 summarize the estimation results for different parity categories. For a probit specification the coefficients report marginal effects.

First, consider the results for women with a decision to have a first child (Table 2.3). The results do not confirm an inverse U-shaped association between fertility and age. There is no significant impact of income variables on the probability of entering motherhood. The probability of having a child is higher for married women. Access to child-care facilities has a positive impact on the fertility decision. The reform seems to shift the fertility intentions of women: I find a significant negative association of introduced changes and a conception decision. The probability of having a child decreases to 11,6 percentage points after implementation. The policy interaction with labour income does not provide any additional evidence<sup>22</sup>.

The policy effect moves another direction for women with a second birth (Table 2.4). There is a positive significant association between a decision to have a second child and reform implementation. After 2007 the probability of a second birth increases to 7,7 percentage points. The interaction with labour income does not provide any

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<sup>21</sup>For a detailed analysis see Hank (2007).

<sup>22</sup>I have estimated different specification with policy interactions on female age, education and employment status. The policy effect does not vary across categories.

Table 2.3: Estimation results: parity 1

	LP	Probit	LP	Probit	LP	Probit	LP	Probit
Policy	-0.06877*** (0.0148)	-0.06926*** (0.0146)	-0.06867*** (0.0166)	-0.06925*** (0.0163)	-0.09600*** (0.0267)	-0.10628*** (0.0295)	-0.10544*** (0.0298)	-0.11698*** (0.0328)
Age	0.02147 (0.0177)	0.02252 (0.0188)	0.02890 (0.0199)	0.02890 (0.0209)	0.02129 (0.0177)	0.02283 (0.0187)	0.02801 (0.0199)	0.02872 (0.0207)
Age2	-0.00039 (0.0003)	-0.00041 (0.0003)	-0.00052 (0.0003)	-0.00051 (0.0003)	-0.00039 (0.0003)	-0.00041 (0.0003)	-0.00050 (0.0003)	-0.00051 (0.0003)
Education	-0.00060 (0.0021)	-0.00047 (0.0020)	-0.00312 (0.0027)	-0.00275 (0.0025)	-0.00063 (0.0021)	-0.00054 (0.0020)	-0.00316 (0.0027)	-0.00282 (0.0025)
Married	0.08521*** (0.0165)	0.08442*** (0.0162)	0.09188*** (0.0190)	0.08884*** (0.0184)	0.08505*** (0.0165)	0.08391*** (0.0162)	0.09121*** (0.0190)	0.08777*** (0.0183)
Part-time employment	-0.03725* (0.0205)	-0.03388* (0.0188)	-0.03662 (0.0236)	-0.03163 (0.0216)	-0.03753* (0.0205)	-0.03434* (0.0189)	-0.03640 (0.0236)	-0.03175 (0.0217)
Labour income	0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)
HH income	0.00000 (0.0000)	0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	-0.00000 (0.0000)	-0.00000 (0.0000)
Child care	0.16373*** (0.0551)	0.15482*** (0.0494)	0.19443*** (0.0619)	0.17990*** (0.0553)	0.16206*** (0.0551)	0.15207*** (0.0494)	0.19370*** (0.0619)	0.17808*** (0.0553)
Policy interaction:								
Labour income					0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	0.00000* (0.0000)
Partner characteristics:								
Age			0.00036 (0.0020)	0.00042 (0.0019)			0.00042 (0.0020)	0.00048 (0.0019)
Education			0.00144 (0.0028)	0.00093 (0.0027)			0.00132 (0.0028)	0.00078 (0.0027)
Labour income			0.00000 (0.0000)	0.00000 (0.0000)			0.00000 (0.0000)	0.00000 (0.0000)

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 2.4: Estimation results: parity 2

	LP	Probit	LP	Probit	LP	Probit	LP	Probit	LP	Probit
Policy	0.08514*** (0.0145)	0.06279*** (0.0108)	0.08640*** (0.0153)	0.05913*** (0.0109)	0.06213*** (0.0225)	0.07103*** (0.0221)	0.07223*** (0.0234)	0.07754*** (0.0226)		
Age	-0.00893 (0.0162)	0.01484 (0.0119)	-0.00114 (0.0175)	0.01565 (0.0117)	-0.00850 (0.0163)	0.01418 (0.0121)	-0.00086 (0.0176)	0.01411 (0.0118)		
Age2	-0.00011 (0.0003)	-0.00046** (0.0002)	-0.00017 (0.0003)	-0.00039** (0.0002)	-0.00011 (0.0003)	-0.00044** (0.0002)	-0.00017 (0.0003)	-0.00036* (0.0002)		
Education	-0.00010 (0.0021)	-0.00006 (0.0011)	-0.00083 (0.0021)	-0.00075 (0.0010)	-0.00007 (0.0021)	-0.00008 (0.0011)	-0.00081 (0.0021)	-0.00079 (0.0010)		
Married	0.05033*** (0.0147)	0.03050*** (0.0078)	0.05034*** (0.0158)	0.02599*** (0.0076)	0.04992*** (0.0147)	0.03051*** (0.0077)	0.05006*** (0.0159)	0.02595*** (0.0076)		
Part-time employment	-0.04488*** (0.0126)	-0.03541*** (0.0097)	-0.02991** (0.0132)	-0.02467*** (0.0095)	-0.04482*** (0.0126)	-0.03552*** (0.0097)	-0.02977** (0.0132)	-0.02500*** (0.0094)		
Labour income	0.00000*** (0.0000)	0.00000*** (0.0000)	-0.00000 (0.0000)	0.00000 (0.0000)	0.00000*** (0.0000)	0.00000*** (0.0000)	-0.00000 (0.0000)	0.00000 (0.0000)		
HH income	0.00000** (0.0000)	0.00000** (0.0000)	0.00000 (0.0000)	0.00000** (0.0000)	0.00000** (0.0000)	0.00000** (0.0000)	0.00000 (0.0000)	0.00000** (0.0000)		
boy1	-0.03010** (0.0125)	-0.02068** (0.0081)	-0.02948** (0.0133)	-0.01952** (0.0079)	-0.03057** (0.0125)	-0.02063** (0.0080)	-0.02971** (0.0133)	-0.01938** (0.0078)		
Age at first birth	0.00334*** (0.0010)	0.00437*** (0.0011)	0.00215* (0.0011)	0.00278*** (0.0010)	0.00326*** (0.0010)	0.00440*** (0.0011)	0.00208* (0.0011)	0.00288*** (0.0010)		
Child care	-0.07034* (0.0389)	-0.03124 (0.0254)	-0.06434 (0.0413)	-0.03228 (0.0243)	-0.06998* (0.0390)	-0.03088 (0.0254)	-0.06370 (0.0413)	-0.03142 (0.0242)		
Policy interaction: Labour income					0.00000 (0.0000)	-0.00000 (0.0000)	0.00000 (0.0000)	-0.00000 (0.0000)		
Partner characteristics: Age			-0.00473*** (0.0014)	-0.00450*** (0.0012)			-0.00476*** (0.0014)	-0.00441*** (0.0012)		
Education			0.00632* (0.0033)	0.00311* (0.0017)			0.00629* (0.0033)	0.00311* (0.0017)		
Labour income			-0.00000 (0.0000)	-0.00000 (0.0000)			-0.00000 (0.0000)	-0.00000 (0.0000)		

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

significant increase in magnitude. In general, the probability of having a second child has an inverse U-shaped association with age. Marital status has a positive impact on fertility intentions of a second birth. The positive effect of household income is significant for some specifications, but the magnitude is around zero. Being in part-time employment decreases the probability of having a second child. The age at first birth has a significant impact on the second birth's decision: the older the woman the greater intention to complete fertility. The findings also confirm a bias in the parental preferences for a child gender. If a first child was a boy the probability of having a second child drops to 0,4 percentage points.

The type of employment - part-time or full-time - does not have a significant impact on the birth decision. I split the sample to check whether the policy effect persists in both groups. The estimation results presented in Table 2.5<sup>23</sup> in the Appendix. The results show that the main changes in the fertility decisions are driven by full-employed category, while for a part-time employment no significant policy shift is observed. The magnitude of the effects changes slightly. The probability of having a first child after the reform decreases to 7,8 percentage points while the probability to have a second child increases to 11,8 percentage points.

I check the robustness of results for different age categories. Since there is some evidence of negative age effect on the conception decisions I consider the age brackets 20-30 and 30-40<sup>24</sup>. The results are robust to age specification. The negative policy effect does not change its' magnitude for a decision to enter motherhood. For a second birth the effect increases for younger mothers by 3,1 percentage points, while for women above 30 the effect drops.

The study sought to estimate the effectiveness of the introduced changes on the parental incentives for employed women. The findings confirm the significant shift in the fertility incentives during the post-reform period. While the probability of entering motherhood decreases after the reform was implemented, up to 11,6 percentage points, the probability of having a second child increases by up to 7,7 percentage points. In both cases the effects are driven by the full-time employed category of females. For a second birth the effect is heterogeneous across age groups, increasing for mother under 30 years old and declining for the older cohort.

## 2.5 Conclusion

This paper estimates the impact of the German parental leave reform on fertility outcomes. The results of short-run effects show that the reform has created a multidirectional response to fertility intentions. On average, women who are currently full-employed and live with a partner tend to postpone the entrance into motherhood after the reform was implemented. On the contrary, the intentions in couples with one child to have a second child have increased since the reform was introduced. The last result is consistent with empirical evidence of the parental leave reform discussed in the literature. Neyer and Andersson (2008), Ronsen (2004) and (Lalive and Zweimller,

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<sup>23</sup>In the robustness check I report results for the probit specification

<sup>24</sup>The sample size do not allow the lower intervals.

2009) find the significant impact of the parental allowance increases on the subsequent births.

The negative association of the motherhood entrance and implemented policy is puzzling. One possible explanation is that for females making their first fertility decision faces higher uncertainty than the mothers with a second child. They may also have higher opportunity costs of the career interruptions. The significance of childcare availability confirms that women anticipate the higher costs of child rearing. This result supports the study by (Spiess and Wrohlich, 2008). Their policy experiment suggests that increasing childcare subsidies might produce a positive effect on the birth decisions of childless women. The results suggest that overall the policy introduced is not effective in stimulating fertility rates in the short-run. On the one hand, it allows women to complete their fertility plan, and on the other hand, it seems to decrease the intentions on motherhood. Given the magnitudes, the summary impact to the total birth rates is insignificant. Notice that it might be the case that a shift in a policy is reflecting some underlying processes in the German society. The counterfactual policy analysis is an important direction for future research.



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## 2.6 Appendix



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Table 2.5: Estimation results: by employment and age

	Full-time		Part-time		Age less 30		Age more 30	
	Parity 1	Parity 2	Parity 1	Parity 2	Parity 1	Parity 2	Parity 1	Parity 2
Policy	-0.07858*** (0.0184)	0.11864*** (0.0221)	-0.04468 (0.0316)	0.00048 (0.0006)	-0.06432*** (0.0208)	0.14962*** (0.0331)	-0.06532*** (0.0226)	0.07604*** (0.0052)
Age	-0.00029 (0.0029)	-0.02006*** (0.0021)	-0.00604 (0.0057)	-0.00004 (0.0001)	0.00309 (0.0047)	-0.01282*** (0.0045)	-0.00516 (0.0039)	-0.00629*** (0.0014)
Education	-0.00498* (0.0027)	0.00101 (0.0022)	0.00974 (0.0063)	-0.00001 (0.0000)	-0.00167 (0.0031)	0.00330 (0.0033)	-0.00344 (0.0034)	-0.00034 (0.0006)
Married	0.11061*** (0.0208)	0.05775*** (0.0174)	0.01138 (0.0363)	0.00002 (0.0001)	0.10592*** (0.0277)	0.10604*** (0.0246)	0.05922*** (0.0215)	0.00346 (0.0045)
Labour income	0.00000 (0.0000)	0.00000*** (0.0000)	0.00000 (0.0000)	-0.00000 (0.0000)	0.00572 (0.0319)	-0.06402*** (0.0235)	-0.06533*** (0.0237)	-0.01642** (0.0071)
HH income	-0.00000 (0.0000)	0.00000*** (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	0.00000 (0.0000)	0.00000** (0.0000)	0.00036*** (0.0001)	0.00000** (0.0000)
Child care	0.17598*** (0.0619)	-0.06008 (0.0527)	0.12439 (0.1339)	0.00001 (0.0001)	-0.00000 (0.0000)	0.00000 (0.0000)	-0.00036*** (0.0001)	0.00000** (0.0000)
boy1		-0.02599 (0.0167)		-0.00027 (0.0004)	0.19562*** (0.0724)	-0.13012* (0.0689)	0.10362 (0.0717)	0.01006 (0.0162)
Age at first birth		0.00406** (0.0017)		0.00002 (0.0000)		-0.04068* (0.0217)		-0.00774 (0.0049)
						-0.00138 (0.0027)		0.00325*** (0.0009)

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

# Chapter 3

## The impact of parental leave policy on child rearing and employment behaviour: the case of Germany

### 3.1 Introduction

There is an ongoing debate in economic literature about the fertility and employment participation decisions trade-off. In accordance with labour economics theory <sup>1</sup>, income and time are the main constraints a woman faces in child-rearing. Children require expenditure not only on food, clothes and education but also on care. If the mother is the main child-care provider, longer work interruptions have both direct costs in terms of household income losses and opportunity costs of human capital depreciation and career path breaks. Women tend to postpone motherhood as they anticipate these economic consequences. After the birth, the priority in time allocation becomes child-caring rather than paid work, particularly for young children under the age of three years.

The described mechanism presents one possible explanation for the negative trend in mother labour force participation. Nevertheless, the pattern changes across countries, Mira and Ahn (2002) show that for a group of countries such as the USA, Sweden, Norway and Denmark, the observed increase in fertility rates did not correspond with a decrease in labour force participation. The observed heterogeneity is partially explained by the family policy differentiation <sup>2</sup>.

In general, family policies seek to relieve economic constraints and maintain the work-family balance. The concerns might be different: demographic burden on the social security system, employment discrimination of mothers, child welfare, etc. Even though the common target is to stimulate fertility and maternal employment, the implementation can be via different channels and policy efficiency can significantly vary given the

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<sup>1</sup>See Hotz *et al.* (1997)

<sup>2</sup>The empirical study of Del Boca *et al.* (2009) shows that variation in family policies accounts for a significant variation in female labour market participation across European countries. The theoretical results of Apps and Rees (2004) suggest that countries with individual taxation and child-care facilities family support are likely to have higher fertility and higher rates of mothers' employment.

institutional context. The aim of this paper is to analyse whether the 2007 parental-leave reform in Germany achieved one of the anticipated goals of increasing maternal employment. Since the reform increased financial resources and shortened the payment period in the first years following the birth, I focus on the behavioural response of women with children under three in employment and child-care arrangements given the availability constraint of child-care institutions.

The parental-leave system is one of the important family policy components that establish parental rights to a job-protected period of child-rearing and allowance. Changes in parental leave have a direct impact on the maternal return-to-work behaviour. For instance, a study by Lalive and Zweimller (2009) confirms that extending the paid job-protected period of parental leave significantly increases the maternal return-to-work duration in Austria. However the effect does not persist in the long-run. Estimating parental-leave policy effects, it is important to account for indirect effects. For newborns under three years old, maternal participation is strongly related to non-parental child-care decision. The restricted availability and high child-care costs might be a significant constraint for policy efficiency.

The relatively low participation rate of mothers with young children is a peculiar characteristic of the German female labour market. Table 3.1 summarizes European cross-country employment rates for mothers with children under six<sup>3</sup>. In the pre-reform period a maternal enrolment rate was less than 50% while the average European rate was around 57%. Among employed mothers, the percentage of part-time employees was 66% which is significantly higher the average European level of 47%.

Table 3.1: Employment rates for female of age 20-49 with children under six.

GEO/TIME	Total employment			Part-time employment		
	2005	2008	Growth rate	2005	2008	Growth rate
<i>European Union</i>	56.9	60.2	5.8%	47.0	46.4	-1.3%
Netherlands	70.0	76.7	9.6%	89.3	87.5	-2.0%
Belgium	67.3	69.7	3.6%	46.3	45.0	-2.8%
France	62.8	67.0	6.7%	36.3	35.3	-2.8%
Austria	62.3	64.8	4.0%	59.3	61.2	3.2%
Luxembourg	62.2	63.8	2.6%	48.1	47.2	-1.9%
Finland	60.5	64.2	6.1%	16.2	17.7	9.3%
United Kingdom	57.2	58.4	2.1%	63.0	59.1	-6.2%
Spain	56.1	59.5	6.1%	31.6	31.3	-0.9%
Greece	53.1	54.1	1.9%	10.2	11.5	12.7%
Italy	51.8	53.9	4.1%	36.9	37.3	1.1%
<b>Germany</b>	<b>46.8</b>	<b>53.0</b>	<b>13.2%</b>	<b>66.1</b>	<b>69.5</b>	<b>5.1%</b>

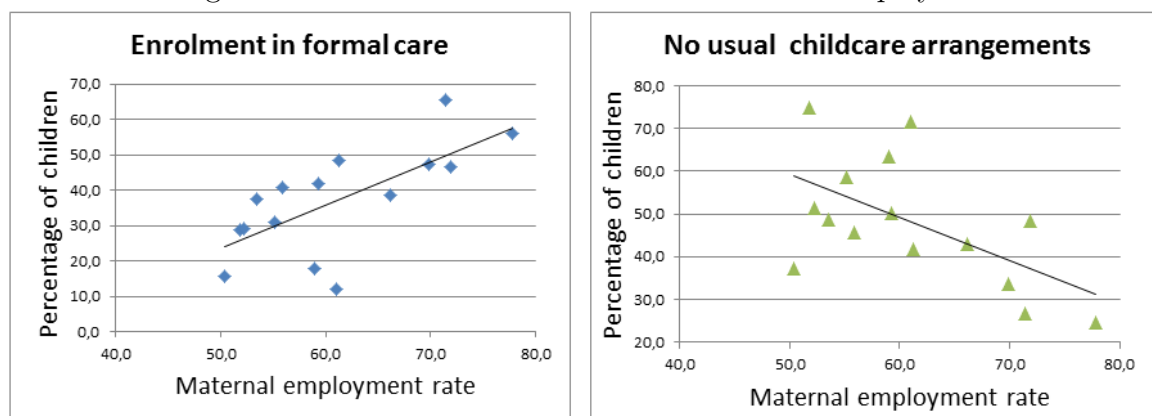
Source: Eurostat 2012, own calculations.

This concern became one of the family policy reform targets in 2006. The government decided to increase the parental leave allowance and reduce the payment period in order to create financial incentives to return to work. In the post-reform period, maternal employment growth improved by around 13%. The shift was accompanied by a 5% increase in part-time employment. These numbers suggest that the reform was successful in increasing maternal employment in the short term.

Child-care arrangements are an important factor for the women's decision to return to

<sup>3</sup>Note the data represents two groups of mothers with different access to child-care provision. Enrolment to pre-school services significantly increases for children aged three to six. It allows mothers to be more flexible with working hours comparing to the group with children below three.

Figure 3.1: Child Care Provision and Maternal Employment



work and, they become a substitute for the caring time by the mother. Figure 3.1 shows the negative correlation between the absence of usual care provision for children under three and the maternal employment rate for a cross-section of European countries in 2008. Germany demonstrates a high level of lack of arrangements, 63,3% compared to the average of 48%. The child-care systems clearly differ across European countries depending on the form of provision and funding. Nevertheless formal child care<sup>4</sup> remains the important source of provision. Figure 3.1 reports positive correlation between the fraction of children provided with outside child care and maternal employment. Germany is clearly noted for a low level of child-care provision, 17,8% comparing to the average 37%<sup>5</sup>. These graphs allow me to conclude that the availability of child-care provision is an important factor for policy consideration.

Although Germany is a country with a generous family support system, the low fertility rate and maternal labour participation show the lack of effectiveness in the implemented policies. There are a number of studies discussing the effects of various historical changes in German family policy regarding fertility and labour. Ondrich *et al.* (2003) show that the liberalization of the maternity-leave system in early 1990s<sup>6</sup> decreased the probability of returning to work. Using the wage data for 1975-2001, Ejrnaes and Kunze (2012) find a negative selection effect for women who return to full-time employment after the first birth. In particular, mothers who decide to return to their job are those who experience relatively high wage losses with birth interruptions.

Few studies consider the 2007 parental-leave reform and its impact on maternal employment. To estimate the effects of the reform, Kluge and Tamm (2009) and Bergemann and Riphahn (2011) use a “natural” experiment approach arguing that the reform introduction was not anticipated by a peculiar population group. Using survey data collected by health insurance funds in two federative states, Kluge and Tamm (2009)

<sup>4</sup>I consider formal child care as daily operated child-care centres and registered child-minders.

<sup>5</sup>One can think that informal child-care arrangements can offset the lack of formal institutes. Similar plotting does not reflect any correlation between informal care and maternal employment. Since the informal arrangements are an important factor, I will discuss it in the following sections.

<sup>6</sup>Maternal leave for child-rearing increased from a job protection period of four to eight in 1986, then to twelve months in 1988, to fifteen in 1990, then to eighteen in 1991. Since 1992, it has been until the third birthday of the child.

find a significant decrease in employment probability during the first 12 months of motherhood. The results differ for the expected employment status in the second year of motherhood where the probability of labour participation increases. Following the same identification strategy for the different German household panel dataset, Bergemann and Riphahn (2011) show the positive effect of the German parental-leave reform on the mothers intention to return to work. Comparing structural and experimental approaches, Geyer *et al.* (2012) use German micro-census data to analyse the employment effects. As in previous studies, the authors find a significant decline in maternal part-time employment during the first year. The overall changes in participation during the second year of the motherhood are insignificant.

There are a number of studies discussing child care provision in Germany and its' role for maternal employment. Muehler (2010) compares public sector with non-public providers. She emphasizes the lack of full-day slots for children under three years and significant regional variation in access. Using micro-simulations, Haan and Wrohlich (2011) conclude that child-care subsidies conditional on maternal employment status increase the labour supply. Bick (2011) counterfactual policy analysis shows that insufficient subsidies for child-care provision decrease labour participation for mothers with children under three years old. Schober (2012) focuses on the allocation of child-care time inside the couple. The 2007 parental-leave reform increased fathers involvement in child care.

Following the literature (Del Boca and Vuri (2007), Lalive and Zweimller (2009)) I study empirical evidence of the effect of family policy changes on maternal employment and child-care decisions. The reform significantly increased the parental leave allowance but shortened the payment period from two to one year. According to the theory ((Becker *et al.*, 1960), Willis (1973), Joseph Hotz *et al.* (1997)), an increase in financial incentives decreases maternal wage losses and postpones the return to work during the payment period. Similarly, the reduction of length creates financial incentives to come back to work when the payment period ends. Therefore, the expected outcomes of the reform are lower participation rates of women with newborns during the first year of their life and higher participation rates during the second year. Given the characteristics peculiar to the German labour market and child-care system, I argue that these results do not hold as German women have restricted access to the child-care system. In theory, the impact of child-care costs on maternal labour decision involves two factors. One is a wage channel: higher child-care prices increase the maternal reservation wage and might decrease participation. The second is free access to the child-care market. When the majority of child care is provided by public institutions and rationing is applied, the formal price of childcare is relatively low. Nevertheless, the effective price is infinite for the families without access to the public slots. Figure 3.1 confirms the shortage of formal child-care arrangements for mothers with children under three. Informal arrangements can be considered as a substitute for mothers' care but their level is relatively low in the case of Germany. In 2008, the informal arrangements were 14,5% comparing to the EU average 23,7%<sup>7</sup>.

Given the child care availability constraints, the effects of the reform on the return-to-work behaviour are ambiguous. I might expect the return ratios to decrease during the first year, insignificant effects for the second year of motherhood and no effect on

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<sup>7</sup> OECD (2011)

child care enrolment decisions. In order to estimate the policy effects, I provide an empirical model of maternal decisions regarding work and child-care use. Using the German household panel survey (SOEP) for 2001-2010, I estimate the joint probability of labour force participation and child-care use. The identification strategy is based on the variation in parental leave duration and allowance induced by reform, variation in partner's labour income and other household characteristics such as marital status and spouses' education. I use the regional variation in child-care enrolment to account for the effects of child-care availability on the labour decision.

Following the literature, the paper provides detailed empirical evidence on the relationship between maternal employment and childcare. Estimating jointly the possibility of various child-care arrangements and different working regimes, it provides additional evidence on the importance of institutional constraints for policy implementation. The estimation results partially confirm the previous research of Kluge and Tamm (2009), Bergemann and Riphahn (2011), Geyer *et al.* (2012). The contradictory finding of decline in the employment probability during the second year of motherhood independently of occupation type confirms the hypothesis of the restricted effectiveness of the introduced incentives to stimulate the return-to-work behaviour. The target of increase in maternal employment might not be achieved due to the significant negative impact of child-care availability on the employment decision. In addition, the policy implementation does not have any significant impact on the child-care decision. The paper is organized as follows. The next section focuses on the institutional characteristics of parental-leave reform and the child-care system in Germany. Section 3 discusses the identification strategy and presents the German data used for the analysis. Section 4 describes the main findings and Section 5 concludes.

## 3.2 Institutional background

### 3.2.1 Family policy in Germany and 2007 parental leave reform

In the following subsection, I will discuss the specific characteristics of the German parental-leave policy and tax and transfer system.

For a long time Germany implemented a complex system of family policy targeted at maternity protection and child rearing. In recent years, the policy focus moved from "bread-winner" to "dual-earner" household. Child rearing as a traditional maternal activity thus becomes the responsibility of the private or public child-care institutions.

The benefit and transfer system for a woman with a new-born currently consists of maternity leave benefit, parental leave benefit, child benefit, child tax allowance and additional household benefits based on the number of children. Child benefits are almost universal in Germany. The eligibility criterion is German or European citizenship, a settlement permit or a residence permit with at least three years' past employment in Germany.

The maternity leave system consists of a period of 14 paid weeks which is typically divided into 6 weeks before childbirth and 8 weeks afterwards. During the maternity protection, mothers are not allowed to work but are insured against dismissal. They also receive maternity benefit (*Mutterschaftsgeld*) which is a net government transfer up to 13 Euros per day and additional coverage equal to the net income if the woman is eligible for social insurance. The category of employed women without government insurance receives a one-time maternity allowance of up to 210 Euros and supplements from the employer.

The parents receive an untaxed allowance (*Kindergeld*) until the child's 18th birthday. For the first and second child, it consists of 184 Euros with a slight increase for a third child - 190 Euros and 214 Euros for each offspring thereafter. The parents can deduct part of the income necessary to maintain a child from their tax return. Low-income households<sup>8</sup> can further apply for in-work tax credit (*Kinderzuschlag*) up to 140 Euros per month for 6 months. Parents may also be eligible for the accommodation allowance (*Wohngeld*) in the form of home-ownership subsidies for low-income families with a higher number of children.

To understand the current parental leave system more clearly, consider the history of the parental leave legislation. It was established in 1986 and underwent changes during the 1990s which increased the length and parental allowance. The important reform in 2000 adjusted the existing regulation to the needs of employed parents. Under this law, the mother or father could share job-protected parental leave of up to three years (*Elternzeit*). During the parental leave, the parent who stayed at home (or worked less than 30 hours per week<sup>9</sup>) received the child-rearing benefit (*Erziehungsgeld*). It was a universal means-tested transfer with an income ceiling (30,000 Euros for the first six months and 16,500 Euros afterwards for a married couple<sup>10</sup>). The eligible period was two years and the payment was 300 Euros per month. If the income threshold was exceeded, the benefit was withdrawn at 63% rate. Thus, the child-rearing benefit depended on the gross income of the household and the maternal labour participation decision. Under the old regulation, the beneficiaries were therefore low-income families as the income threshold and the amount made payment negligible for middle and high-income households.

Negative trends in reproductive behaviour and low participation rate of mothers with young children under three<sup>11</sup> initiated the further reforms to the parental leave system. As it is discussed by Spiess and Wrohlich (2008), the main idea of the 2007 reforms was to change the existing system towards the Scandinavian model of the "dual-earner household". There was a belief in German political debate that the Scandinavian model with a high supply of publicly-funded day-care and generous parental leave system promoted higher employment rates among mothers with young children and higher fertility rates by means of the mechanism to reduce family income losses after childbirth. The new system was established at the end of 2006 and started to be applicable for children born after 1 January of 2007.

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<sup>8</sup>Income up to 900 Euros per couple or 600 Euros per single parent

<sup>9</sup>It is equivalent to reduced full-time work in Germany

<sup>10</sup>These thresholds were applied from 2004 onwards and they had previously stood at 51130 Euros per year per married couple

<sup>11</sup> For instance, 48% in Germany compared to 77% in Sweden, OECD 2006.

The main changes of the reform are related to the financial component. Under the new system, the means-tested benefits are replaced by the parental allowance (Elterngeld) which accounts for 67% of the rearing-parent labour net income per month. The sum is at least 300 Euros and at most 1800 Euros. The replacement rate increases to 100% in the case of the rearing parent net income being under 1000 Euros per month. Another important change is the cut-off in the duration payment period. The parental allowance is granted for 14 months of joint duration that means both parents share the child-rearing period and only for 12 months in single-carer case. To sum up, the new system of parental leave became more generous but for a shorter time-period.

As discussed in Bergemann and Riphahn (2011), the standard labour supply models predict the positive impact of the policy on the female labour force participation. The increase in amount of benefits and decline in the paid period create sizeable income decrease creating a strong incentive to maintain the household income level by returning to work. However the heterogeneity of the response might be observed depending on the prior labour income. Under the old system in Germany, the difference in terms of parental leave between high and low-income mothers was smaller than under the new one.

Note that there is no clear impact of the reform on the household fertility decisions. On the one hand, the female direct and opportunity losses decrease through the income effect discussed earlier. However, the positive impact of a policy would preserve if and only if female preferences are towards continuing labour-force participation, i.e. the utility of consumption through increasing income is higher than the utility of rearing children. The other effect of the reform is related to the negative incentive for new mothers to plan additional children or give birth to planned children more quickly as it is biologically difficult to have children within one year.

### 3.2.2 Child care provision

The German child-care system represents a universal mixed-market provision by public institutions and different types of non-state providers such as religious institutions, private non-profitable organizations, commercial day-care centres and private sector provided by nannies, child-minders or family day-care. The main differences are ownership and management. While public centres are under municipality or local-authority control, private non-profitable organizations mainly belong to welfare organizations. Centres run by churches are part of the public market. The owners of commercial centres are entrepreneurs or companies providing child-care services for employees. According to the survey “Children and Personnel in Child-Care Centres”<sup>12</sup>, public centres had 34% of total market share in 2009. The religious centres run by churches covered 36% of the market, while the non-profitable centres operated by non-public institutions represented 28% of the market share. The proportion of commercial centres was significantly low - around 2%. Apart from the public institutes run by public authorities all the other categories are eligible for public finance. Therefore the German child-care market can be defined as highly state-dependent.

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<sup>12</sup>The data is a part of annual Child and Youth Welfare Survey collected by the German Federal Statistical Office



The German market is characterized by price rationing. The local communities who finance and run the majority of public child-care institutions set the fees based on household income and the child's age<sup>13</sup>. Borck and Wrohlich (2011) report the following numbers for children under three years old. In 2005, the parents' monthly fees on average were 100 Euro for a part-time slot and 120 Euro for a full-time slot while public expenditure was around 700 Euro per month per child.

Since public child care is relatively cheap there is a high demand for slots. It is accompanied by low availability and high heterogeneity across East and West Germany, in particular for children under three years old. Haan and Wrohlich (2011) summarize that public child-care slots were available only to 8% of this age category in Western Germany in 2006, while it accounted for 40% in Eastern Germany.<sup>14</sup> Muehler (2010) shows that the largest part of the West German market is served by non-profitable organizations while municipal public institutions are more typical for the East. The additional heterogeneity comes from the distribution of child-care providers at regional level. Therefore the child-care supply might contain systematic differences by region or by parental preferences regarding the type of child-care provider. However, the results from Muehler (2010) confirm that non-profitable and commercial centres serve a substantially higher share of full-time child care for children under three years old compared to public providers even if the regional factor and provider distribution are controlled.

The existence of considerable excess demand for subsidized child care is a potential drawback of the reform. Since the private child-care sector is considerably expensive and it cannot be regarded as an alternative of public sector, women face an important constraint when making the decision regarding their labour participation decision.

### 3.3 Empirical Specification and Data Description

#### 3.3.1 Empirical model

The main focus of the paper is to evaluate policy-induced changes in the parental leave payment system in terms of the behaviour of mothers with newborns. Following Del Boca and Vuri (2007), I consider the household which derives utility from household net income  $Y_{it}$ , leisure time  $l_{it}$  and child care  $CC_{it}$ . To avoid the problem of household bargaining, assume that in each period of time a woman optimally decides about her employment  $L_{it}$  and child care  $CC_{it}$  behaviour, i.e. she maximizes the household utility conditioning on her partner's behaviour.<sup>15</sup>

$$U = u(CC, l)$$

The goods are assumed to be normal.

<sup>13</sup>The privately subsidized institutions use a similar scheme.

<sup>14</sup>East Germany inherited the child-care system from the former German Democratic Republic where the family policy stimulated maternal employment.

<sup>15</sup>Steiner and Wrohlich (2004) show the insignificance of the cross elasticities among the partners.

At given date  $t$  for the household  $i$  the female choice set is  $L_{it} \times CC_{it}$  combinations, where  $L_{it} = 1$ , if woman works, 0 otherwise, and  $CC_{it} = 1$ , if she uses an additional help from spouse, relatives, public or private child care institutions or nanny. If she rears the child on her own,  $CC_{it} = 0$ . Notice that the net household income varies on the set of possible outcomes:

- $(0, 1)$  the woman does not work, staying in the household to take care of child alone.
- $(1, 0)$  the woman works, birth occurred and child care is provided by the private or public systems.
- $(0, 0)$  the woman does not work, takes care of child with additional help.

Since the aim of the estimation is to capture the effect of changes in parental leave incentives, some of the possible outcomes are excluded. The possibility to work and be the main child-care provider simultaneously is not allowed.

To be on parental leave or to return to regular employment are simultaneous decisions. Therefore, the set of possible outcomes can be defined as

- $L_{it}$  is maternal employment decision,  $L_{it}$  is binary variable equal to 1 if she has returned to her regular job.
- $CC_{it}$  is maternal child care decision,  $CC_{it} = 1$  if a mother decides to stay on parental leave and use child care, 0 otherwise.

The econometric specification of the model is

$$Pr(L_{it} = 1) = F(X'_{1it}\beta_1) \quad (3.1)$$

$$Pr(CC_{it} = 1) = F(X'_{2it}\beta_2) \quad (3.2)$$

The likelihood function to be maximized is

$$L = \prod_{t=1}^T \prod_{i=1}^N Pr(L_{it} = 1)^{L_{it}} \cdot Pr(CC_{it} = 1)^{CC_{it}} \cdot Pr(L_{it} = 0)^{(1-L_{it})} \cdot Pr(CC_{it} = 0)^{(1-CC_{it})}$$

Following Laroque and Salanie (2008), the identification relies on the variation in financial incentives induced by parental leave reform, variation in the partner's labour income, non-linearities in income taxation status and other household characteristics such as marital status. The regional variation is related to availability of child-care institutions. Given the choice simultaneity, the empirical specification of the model is the following:

- Linear probability model using seemingly unrelated regressions (SUR)

$$Pr(L_{it} = 1 | controls) = \alpha_0 + \alpha_1 D_i + \alpha_2 D_i Empl_{bef} + \sum_{i=4}^k \alpha_i X_{1i} \quad (3.3)$$

$$Pr(CC_{it} = 1 | controls) = \beta_0 + \beta_1 CC_{enrol} + \sum_{i=2}^k \beta_i X_{2i} \quad (3.4)$$

where  $L_{it}$  is mother's employment decision;  $CC_{it}$  is mother's child care decision;  $D_i$  is policy indicator;  $CC_{enrol}$  is enrollment ratio;  $CC_{formal}$  is actual use of formal child care;  $X_{ji}$  is a vector of household

- Seemingly unrelated probit models with binary outcomes

$$Pr(L_{it} = 1|controls) = F(\alpha_0 + \alpha_1 D_i + \alpha_2 D_i Empl_{bef} + \sum_{i=4}^k \alpha_i X_{1i}) \quad (3.5)$$

$$Pr(CC_{it} = 1|controls) = F(\beta_0 + \beta_1 CC_{enrol} + \sum_{i=2}^k \beta_i X_{2i}) \quad (3.6)$$

### 3.3.2 Data and descriptive evidence

The empirical analysis is based on the German Social Economic Panel (SOEP) data which is longitudinal household survey collecting the information on demographic, income and labour market variables from the representative sample of German private households<sup>16</sup>. It currently covers around 12,000 households, 22,000 adult respondents and 5,000 children living in the surveyed households.

To analyse the effects of the parental leave reforms on the child-care and “return-to-work” behaviour, the SOEP provides data on child-care time allocation of mothers with newborns. Since 2003, the survey has been collecting detailed information on the various characteristics of newborn offspring (2002 and the subsequent birth years) using the “Mother and Child” questionnaire<sup>17</sup>. I construct the dataset using waves for 2001-2010<sup>18</sup>. The sample consists of 1254 women who gave birth to 1595 offspring within the considered period<sup>19</sup>. The observational unit is the birth of a child. Women with the births of siblings during the period of interest are treated as separate observations<sup>20</sup>. The age interval is between 20 and 46 years old. The sample is unbalanced since 70% of the births happen before the policy implementation. The list of variables is presented in Table 3.5 in Appendix.

The objective of the analysis is labour participation and child-care decisions during the first two years of motherhood, I follow each mother up to 24 months after birth.<sup>21</sup> Monthly information on employment, periods of maternity leave and month of the birth of the child allows when the woman plans to return to work to be identified exactly the month after a birth. I consider only the first transition into employment. I consider only the first transition into employment. The SOEP also provides information on employment status so I construct three referring categories:

- *empl1* defines group of women who return to full-time employment after giving birth;
- *empl2* defines group of women who return to full or regular part-time job;

<sup>16</sup>For more detailed information see Wagner *et al.* (2007).

<sup>17</sup>The questionnaire covers such issues as time of pregnancy, initial motherhood evaluation, health and child care of newborns, including the information on the support of a partner.

<sup>18</sup>Since the ultimate reform related with family policy took place in 2000, I assume that the only expected impact on mothers’ decisions comes from the changes of 2007. The information on 2011 will be released in April 2013.

<sup>19</sup>I exclude women who gave birth during December 2006 and January 2007. Neugart and Ohlsson (2013) found the empirical evidence of birth shifting towards January 2007 when the new parental system came into force

<sup>20</sup>Women who gave birth to twins are treated as a single unit.

<sup>21</sup>Note that that the information set is restricted for mothers who gave birth in 2008 and 2009.

- *empl3* defines group of women who return to regular part-time job.

Regarding child-care decision, I consider both discrete (CK1) and continuous (TC) variables which by default are equal to 0 if mother does not get any help with child care and 1 or number of hours provided otherwise. The survey allows different types of child care providers to be distinguished. Additionally, I define the following categories:

- $CK_m$  and  $TK_m$  partner helps with child-rearing;
- $CK_{gran}$  and  $TK_{gran}$  grandparents help with child-rearing;
- $CK_{rel}$  and  $TK_{rel}$  other relatives help with child-rearing;
- $CK_{inst}$  and  $TK_{inst}$  private or public institutions help with child-rearing.<sup>22</sup>

To summarize the type of child care used, I consider formal child care provided by public and private institutions and informal child care from partners, grandparents, relatives and friends. To account for the child-care availability constraint discussed above, I construct the variable which represents the ratio of children under three in formal child care to the total number of children under three in the region<sup>23</sup>. I control for regional dummies. To account for personal characteristics, I consider the age, education, partnership status, employment status and individual labour income before the birth. If a partner lives in the household, I include his personal characteristics and income.

The main summary statistics of the variables are presented in Table 3.2. The explanatory variables are measured at the last employment spell prior to the birth.

In general, 22, 51%<sup>24</sup> of mothers work after giving birth. Around 78% of them return to their full-employment position while less than 35% return to a regular part-time job. The left part of the sample consists of women who did not work before, but enter the labour force after the child birth. They prefer part-time work.

Table 3.2 shows that the parental benefits significantly increased after the implementation of the reform, on average for 1000 Euros per year. There are no other significant differences in the personal characteristics for women who gave birth before and after the policy implementation. The only thing to note is that the share of employed women who decided to have children after the reform significantly increased. The preliminary analysis shows that after the policy implementation, the share of women who return to work decreased by 3% on average. Childcare is characterised by the decreasing share in the help provided by the relatives. There is also a time reallocation effect: the number of grandparent child-carer decreases while the partner participation increases comparing to the period before reform.

<sup>22</sup>I do not consider separately the nursery places and nanny because of the sample size problem.

<sup>23</sup>The calculations are based on the German administrative child care (“Statistik der Kinder- und Jugendhilfe”) and population (“Bevölkerungsstand: Bevölkerung nach Geschlecht und Altersgruppen”) data for 2006.

<sup>24</sup>6, 39% are fully employed and 16, 12% are in part-time employment.

Table 3.2: Summary statistics

Variable	Before policy		After policy		Mean test	
	Mean	Std Deviation	Mean	Std Deviation	Mean difference	t-statistics
empl1_full	0.0418	0.2002	0.0191	0.1372	0.0226*	(2.14)
empl1_part	0.0931	0.2907	0.0431	0.2032	0.0501**	(3.24)
empl1_total	0.1349	0.3418	0.0622	0.2418	0.0727***	(4.00)
empl2_full	0.0357	0.1856	0.0120	0.1088	0.0237*	(2.46)
empl2_part	0.1010	0.3014	0.0383	0.1921	0.0627***	(3.97)
empl2_total	0.1366	0.3436	0.0502	0.2187	0.0864***	(4.80)
emplt_full	0.0775	0.2674	0.0311	0.1738	0.0464***	(3.30)
emplt_part	0.1941	0.3957	0.0813	0.2737	0.113***	(5.38)
emplt_total	0.2715	0.4449	0.1124	0.3163	0.159***	(6.72)
CK1	0.8947	0.3071	0.8828	0.3221	0.0119	(0.67)
CK_m	0.7911	0.4067	0.7895	0.4082	0.0017	(0.07)
CK_gran	0.5117	0.5001	0.5024	0.5006	0.0094	(0.33)
CK_rel	0.1941	0.3957	0.1483	0.3558	0.0458**	(2.08)
CK_inst	0.1044	0.3060	0.0933	0.2912	0.0111	(0.65)
TK	20.7413	20.3003	21.6856	23.7849	-0.944	(-0.73)
TK_m	15.7448	17.0206	17.8515	22.0451	-2.107**	(-1.77)
TK_gran	7.5578	8.6915	6.4714	6.5623	1.086**	(1.65)
TK_rel	4.7130	4.4254	4.3548	4.0533	0.358	(0.57)
TK_inst	12.6250	15.7987	12.3590	14.4868	0.266	(0.09)
CK_informal	0.7903	0.4073	0.7895	0.4082	0.000779	(0.03)
CK_formal	0.1044	0.3060	0.0933	0.2912	0.0111	(0.65)
age	30.6199	5.2889	31.0858	5.1250	-0.466*	(-1.53)
educ	12.2943	3.6755	12.3273	4.2015	-0.0330	(-0.15)
child1	0.4560	0.4983	0.4282	0.4954	0.0278	(0.98)
singl	0.0809	0.2729	0.0933	0.2912	-0.0124	(-0.78)
married	0.6188	0.4859	0.6292	0.4836	-0.0104	(-0.37)
coh	0.3003	0.4586	0.2775	0.4483	0.0227	(0.87)
origin	0.8416	0.3653	0.8612	0.3461	-0.0196	(-0.95)
empl1_bef	0.3621	0.4808	0.3254	0.4691	0.0367*	(1.34)
empl2_bef	0.5518	0.5164	0.5598	0.5113	-0.00802	(-0.27)
empl3_bef	0.1897	0.3923	0.2344	0.4242	-0.0447**	(-1.95)
matben	2281.37	2482.96	3359.17	3590.49	-1077.8***	(-6.69)
childnum	1.8277	1.0860	1.8780	1.0804	-0.0503	(-0.81)
CC_coverage	0.1596949	0.1363499	0.1559002	0.1332016	0.00379	(0.49)
<i>Income variables</i>						
labinc_bef	20910.89	15018.12	19687.19	15445.79	1223.7	(1.13)
labinc_aft	16587.45	15293.57	14040.72	16426.09	2546.7	(1.11)
wagegro_bef	1725.69	1100.93	1699.07	1141.52	26.62	(0.34)
wagegro_aft	1396.31	1210.30	1336.67	1079.56	59.64	(0.36)
wagenet_bef	1089.89	653.00	1092.36	699.17	-2.468	(-0.05)
wagenet_aft	1179.66	731.83	1064.55	721.92	115.1	(0.97)
housinc	2606.80	1346.44	2672.21	1205.70	-65.40	(-0.84)
<i>Partner characteristics</i>						
agem	33.7292	5.5621	34.2453	5.5162	-0.516*	(-1.42)
educm	12.5851	3.6724	12.7298	3.3468	-0.145	(-0.62)
empl1m	0.8507	0.3566	0.8385	0.3686	0.0122	(0.52)
labincm	39209.44	27376.23	37279.03	23138.27	1930.4	(1.06)
wagegrom	3095.09	1819.51	2957.52	1625.35	137.6	(1.13)
wagenetm	1998.91	1072.32	1954.20	980.95	44.71	(0.62)
<i>Other characteristics</i>						
east_west	0.7380	0.4399	0.7297	0.4447	0.00837	(0.33)

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

### 3.4 Estimation Results

The baseline estimation results are presented in Table 3.3 using the SUR of the model specified in the Section 3.3.1. Note that due to the non-linearities in error-term distributions, the magnitude of the coefficients should be interpreted with care. In general, the parental-leave reform produced non-linear heterogeneous response in maternal labour participation decisions.

Consider the first year of motherhood. In general, women's education and labour force participation prior to a birth have a positive impact on labour force participation. Women who live in East Germany have higher probability of working. For a full-time employed category, the higher income of the partner and a first-born child decrease the ratio of participation. The possibility of accessing formal child care institutions increases the probability of working full time. The estimation results confirm that the reform has produced a negative effect on maternal participation during the first year of motherhood. However, the response is heterogeneous across different employment groups. For full-time employed mothers, the proportion of women, who worked before the birth full-time, decreases, i.e. mothers postpone their return to the job. For a part-time employed women, the probability of working decreases after the policy implementation without amplifying the effect for women who previously held in regular part-time work.

If a woman decides to come back to full-time work during the second year of motherhood, the effect becomes less pronounced. On the contrary, the magnitude of the policy impact increases for a part-time participation. There is an insignificant negative impact for child-care decision policy. The child-care decision mechanism remains ambiguous since most of the coefficients are insignificant. The estimation results for the bivariate probit specification are reported in Table 3.6 in Appendix. Table 3.6 shows that the policy impact on the probability of returning-back-to-work is negative and significant, and drops on 0,58 percentage points on average during the first year of motherhood. However, the policy effect is mainly driven by the group of women in regular full-time employment. For part-time employment, the probability drops on 5,9 percentage points independently on the previous working status. For these subgroups, the use of formal child care decreases.

Table 3.3: SUR estimation results for different return-to-work categories

	First year			Second year			Two years			
	Full-time	Part-time	Total	Full-time	Part-time	Total	Full-time	Part-time	Total	Child care
policy	0.00415 (0.0150)	-0.0610** (0.0218)	-0.0217 (0.0333)	-0.00899 (0.0138)	-0.0739** (0.0223)	-0.0767** (0.0326)	-0.00484 (0.0192)	-0.135*** (0.0291)	-0.0984** (0.0416)	-0.0235 (0.0213)
educ	0.00789*** (0.00261)	0.0127*** (0.00405)	0.0205*** (0.00462)	-0.00287 (0.00240)	0.00324 (0.00414)	0.000261 (0.00453)	0.00502 (0.00336)	0.0160*** (0.00539)	0.0207*** (0.00576)	-0.00216 (0.00453)
age	-0.000885 (0.0115)	0.0224 (0.0178)	0.0215 (0.0204)	-0.000185 (0.0106)	0.000760 (0.0182)	0.000197 (0.0200)	-0.00107 (0.0148)	0.0232 (0.0238)	0.0195 (0.0254)	0.00867 (0.0200)
age2	1.56e-05 (0.000180)	-0.000400 (0.000278)	-0.000383 (0.000317)	2.06e-05 (0.000165)	1.58e-05 (0.000284)	7.72e-05 (0.000311)	3.63e-05 (0.000231)	-0.000384 (0.000370)	-0.000306 (0.000396)	-0.000141 (0.000313)
married	0.0173 (0.0136)	-0.0387* (0.0211)	-0.0205 (0.0241)	0.0161 (0.0125)	-0.0202 (0.0215)	-0.00179 (0.0236)	0.0334* (0.0175)	-0.0589** (0.0281)	-0.0223 (0.0301)	0.0157 (0.0237)
child1	-0.0550*** (0.0165)	0.0144 (0.0253)	-0.0453 (0.0279)	0.0189 (0.0152)	-0.00791 (0.0258)	-0.00266 (0.0273)	-0.0361* (0.0212)	0.00653 (0.0337)	-0.0479 (0.0348)	-0.0565** (0.0288)
childnum	-0.0102 (0.00710)	-0.00384 (0.0111)	-0.0150 (0.0127)	-0.00519 (0.00653)	8.77e-06 (0.0113)	-0.00476 (0.0124)	-0.0154* (0.00913)	-0.00383 (0.0148)	-0.0198 (0.0158)	-0.0266** (0.0123)
labinc_bef	4.07e-07 (4.89e-07)	7.91e-07 (6.38e-07)	1.26e-06 (8.90e-07)	6.88e-07 (4.50e-07)	1.64e-06** (6.51e-07)	1.53e-06* (8.72e-07)	1.09e-06* (6.29e-07)	2.43e-06*** (8.49e-07)	2.78e-06** (1.11e-06)	-6.95e-07 (8.46e-07)
matben	3.09e-07 (1.94e-06)	-4.21e-07 (3.01e-06)	4.21e-09 (3.45e-06)	2.73e-06 (1.79e-06)	8.58e-06*** (3.08e-06)	1.13e-05*** (3.38e-06)	3.04e-06 (2.50e-06)	8.16e-06** (4.01e-06)	1.13e-05*** (4.30e-06)	1.41e-06 (3.37e-06)
CC_coverage	0.308*** (0.0896)	0.0560 (0.139)	0.360** (0.158)	0.147* (0.0825)	0.0293 (0.142)	0.173 (0.155)	0.455*** (0.115)	0.0853 (0.185)	0.533*** (0.198)	-0.0598 (0.0778)
agem	0.00217 (0.00140)	0.00185 (0.00217)	0.00425* (0.00248)	-0.000901 (0.00129)	-0.00383* (0.00222)	-0.00479** (0.00243)	0.00127 (0.00180)	-0.00199 (0.00289)	-0.000543 (0.00309)	0.000511 (0.00244)
educm	-0.00693*** (0.00247)	-0.00361 (0.00382)	-0.0106** (0.00437)	-0.00235 (0.00228)	0.00341 (0.00391)	0.00147 (0.00428)	-0.0028*** (0.00318)	-0.000200 (0.00509)	-0.00917* (0.00545)	0.00449 (0.00428)
labincm	-8.21e-07*** (2.36e-07)	3.73e-08 (3.66e-07)	-7.64e-07* (4.17e-07)	2.70e-07 (2.17e-07)	6.03e-07 (3.74e-07)	9.26e-07** (4.09e-07)	-5.50e-07* (3.04e-07)	6.40e-07 (4.88e-07)	1.62e-07 (5.20e-07)	6.13e-07 (4.10e-07)
east_west	0.0476* (0.0275)	0.0939** (0.0426)	0.139*** (0.0485)	-0.0640** (0.0253)	-0.0798* (0.0435)	-0.142*** (0.0475)	-0.0165 (0.0353)	0.0141 (0.0567)	-0.00369 (0.0606)	0.0432 (0.0284)
empl1_bef	0.103*** (0.0177)			0.0399** (0.0163)			0.143*** (0.0227)			
pempl1_bef	-0.0802*** (0.0254)			-0.0528** (0.0234)			-0.133*** (0.0327)			
empl3_bef		0.100*** (0.0242)			0.0693*** (0.0247)			0.170*** (0.0322)		
pempl3_bef		-0.0238 (0.0433)			0.00453 (0.0442)			-0.0193 (0.0577)		
empl2_bef			0.111*** (0.0293)			0.0846*** (0.0287)			0.195*** (0.0366)	
pempl2_bef			-0.115*** (0.0434)			-0.0369 (0.0425)			-0.152*** (0.0542)	
Constant	-0.110 (0.183)	-0.464 (0.283)	-0.579* (0.323)	0.0980 (0.168)	0.116 (0.289)	0.242 (0.316)	-0.0116 (0.235)	-0.348 (0.377)	-0.337 (0.403)	0.762** (0.313)
Observations	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098
R-squared	0.122	0.07	0.112	0.105	0.073	0.136	0.178	0.106	0.191	0.016

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 3.4 presents the effects of the introduced incentives during the second year of motherhood. For full-time employed women, I do not find any significant changes in maternal decision of employment. The effect persists for part-time employed females. The probability of working on a regular part-time basis decreases on 6,5 percentage points.

The total effect over the two years is shown in Table 3.7 in Appendix. The implementation of policy decreases the maternal participation probabilities by 16 percentage points. Labour force participation, high education and access to formal child care have a positive impact on the participation rate.

The reform design suggests that the implemented financial scheme of parental leave payment might produce different incentives for maternal return-to-work depending on income category. I check whether the baseline estimation results are robust to the different income definitions such as monthly gross and net wage of the mother before giving birth, her partner's monthly wage and household income. I also use working hours instead of labour income. Controlling for the different categories I find the same pattern in terms of policy effect on the probability of being employed. The policy results are robust to the different income definitions and across income groups.

I consider the different age brackets 20-30 and 30-40<sup>25</sup>. The results are robust to the age specification. Using age difference (age of the wife - age of the husband) instead of age still confirms the negative impact of the policy on the maternal employment probability.

The empirical results show a decline in the probability of returning to work both in the first and second year of motherhood independently of whether they hold a full or part-time job. While the first year results are consistent with empirical findings in the literature (e.g. Kluge and Tamm (2009), Bergemann and Riphahn (2011), Geyer *et al.* (2012)), the decrease in participation rate for a part-time employed women during the second year is a new finding in the analysis of German parental leave. This result confirms that the parental leave duration for the current child has a strong impact on the short-run labour market outcomes. Given constraint in child-care availability and relatively low losses of future incomes mothers might prefer to postpone their return to employment. To sum-up the empirical evidence does not confirm the policy defectiveness to stimulate maternal employment.

### 3.5 Conclusion

The objective of this paper is to investigate whether the duration of job-protected paid parental leave has a significant impact on the labour market outcomes of women with new-borns. The empirical analysis is based on a 2007 reduction of parental-leave duration from two years to one year accompanied by significant increase of parental-leave allowance. Accounting for mothers' child-care arrangements, I find that the reform affects maternal labour outcomes in two directions. First, the higher parental leave allowance decreases the income losses of the mothers who were employed before the child births. As a result the probability of returning to work decreases during

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<sup>25</sup>The sample size do not allow the lower intervals.



Table 3.4: Bivariate probit estimation results for the employment during the second year of motherhood

	Full-time	Child care	Marginal effects	Part-time	Child care	Marginal effects	Total	Child care	Marginal effects
policy	-0.434 (0.487)	-0.124 (0.115)	-0.00232 (0.00235)	-0.745*** (0.213)	-0.125 (0.115)	-0.0656*** (0.0140)	-0.701*** (0.153)	-0.125 (0.115)	-0.0719*** (0.0125)
educ	-0.0497 (0.0537)	-0.0133 (0.0254)	-0.000338 (0.000397)	0.0278 (0.0278)	-0.0130 (0.0254)	0.00287 (0.00307)	0.0133 (0.0269)	-0.0128 (0.0254)	0.00143 (0.00338)
age	-0.0803 (0.254)	0.0328 (0.109)	-0.000506 (0.00169)	0.0130 (0.129)	0.0322 (0.108)	0.00191 (0.0143)	-0.0327 (0.124)	0.0337 (0.108)	-0.00347 (0.0156)
age2	0.00151 (0.00400)	-0.000550 (0.00169)	9.56e-06 (2.67e-05)	6.65e-05 (0.00199)	-0.000549 (0.00169)	-9.85e-07 (0.00220)	0.000831 (0.00192)	-0.000575 (0.00169)	9.34e-05 (0.000241)
married	0.217 (0.231)	0.0773 (0.128)	0.00128 (0.00136)	-0.150 (0.136)	0.0764 (0.128)	-0.0161 (0.0168)	-0.0550 (0.130)	0.0751 (0.128)	-0.00553 (0.0168)
child1	0.253 (0.488)	-0.281* (0.157)	0.00157 (0.00404)	-0.0218 (0.184)	-0.282* (0.157)	-0.00675 (0.0198)	-0.0395 (0.170)	-0.279* (0.158)	-0.0102 (0.0208)
childnum	-0.235 (0.352)	-0.116* (0.0615)	-0.00164 (0.00229)	-0.0152 (0.0924)	-0.116* (0.0616)	-0.00342 (0.0102)	-0.0364 (0.0921)	-0.116* (0.0616)	-0.00674 (0.0116)
labinc_bef	2.20e-05** (8.69e-06)	-3.65e-06 (4.56e-06)	1.43e-07 (8.86e-08)	1.02e-05** (4.10e-06)	-3.65e-06 (4.56e-06)	1.07e-06** (4.55e-07)	6.86e-06 (4.63e-06)	-3.44e-06 (4.56e-06)	7.95e-07 (5.85e-07)
matben	5.41e-05* (3.24e-05)	6.53e-06 (1.89e-05)	3.62e-07 (2.91e-07)	5.33e-05*** (1.87e-05)	6.72e-06 (1.90e-05)	5.96e-06*** (2.07e-06)	6.09e-05*** (1.79e-05)	6.69e-06 (1.89e-05)	7.76e-06*** (2.27e-06)
CC_coverage	1.429 (1.179)	-0.298 (0.421)	0.00922 (0.00951)	0.0880 (0.898)	-0.298 (0.420)	0.00517 (0.0988)	0.741 (0.822)	-0.293 (0.420)	0.0874 (0.103)
agem	-0.0236 (0.0299)	0.00238 (0.0138)	-0.000154 (0.000209)	-0.0274 (0.0167)	0.00292 (0.0138)	-0.00297 (0.00183)	-0.0290* (0.0158)	0.00312 (0.0138)	-0.00358* (0.00199)
educm	-0.0690 (0.0529)	0.0234 (0.0242)	-0.000439 (0.000416)	0.0188 (0.0266)	0.0234 (0.0242)	0.00242 (0.00294)	0.0104 (0.0258)	0.0229 (0.0242)	0.00173 (0.00324)
labincm	5.17e-06 (5.41e-06)	3.86e-06 (2.55e-06)	3.69e-08 (4.20e-08)	3.65e-06 (2.33e-06)	3.77e-06 (2.54e-06)	4.59e-07* (2.59e-07)	4.97e-06** (2.27e-06)	3.78e-06 (2.54e-06)	6.94e-07** (2.88e-07)
east_west	-1.314*** (0.408)		-0.0299 (0.0210)	-0.478* (0.272)		-0.0639 (0.0433)	-0.671*** (0.252)		-0.108** (0.0502)
empl1_bef	0.419 (0.293)	0.229 (0.158)	0.00367 (0.00370)		0.233 (0.158)	0.00341 (0.00238)		0.218 (0.158)	0.00394 (0.00286)
pempl1_bef	-0.424 (0.632)		-0.00178 (0.00203)						
empl3_bef				0.372** (0.148)		0.0479** (0.0219)			
pempl3_bef				0.350 (0.317)		0.0483 (0.0527)			
empl2_bef							0.557*** (0.165)		0.0659*** (0.0184)
pempl2_bef									
Constant	0.910 (3.985)	0.755 (1.697)		-1.429 (2.055)	0.754 (1.695)		-0.547 (1.965)	0.732 (1.694)	
Observations	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098
rho	-0.135			-0.117			-0.141		
se	(0.150)			(0.0941)			(0.0894)		

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

the first year of motherhood. These findings are consistent with previous empirical evidence (see Kluge and Tamm (2009), Bergemann and Riphahn (2011), Geyer *et al.* (2012)). Second, changes in the duration of a paid parental leave do not produce any significant positive effect on the maternal labour participation during the second year of motherhood. Moreover, for part-time employed women the probability of working after a birth decreases. I think that such negative impact is related to the institutional characteristics of the German child-care provision. Bick (2011) shows that the low coverage of public child care, the absence of private child-care market together with low levels of informal arrangements might create a barrier for a mother to participate in the labour market. Providing the empirical evidence on how effective is the German policy on the stimulating maternal employment is important for further policy analysis. Our results suggest that the implementation of the reform can produce ambiguous effects for the targeted group in the short-run if the institutional constraints are not taken into account.



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### 3.6 Appendix

Table 3.5: Variables description

Label	Description
<b>Employment status</b>	
empl1_full	Indicator variable equal to 1 if the woman is back to full-time during 1st year
empl1_part	Indicator variable equal to 1 if the woman is back to part-time during 1st year
empl1_total	Indicator variable equal to 1 if the woman is back to employment during 1st year
empl2_full	Indicator variable equal to 1 if the woman is back to full-time during 2nd year
empl2_part	Indicator variable equal to 1 if the woman is back to part-time during 2nd year
empl2_total	Indicator variable equal to 1 if the woman is back to employment during 2nd year
<b>Child care</b>	
CK1	Indicator variable equal to 1 if the woman gets an additional child care help
CK_rel	Indicator variable equal to 1 if the other relatives help with a child
CK_inst	Indicator variable equal to 1 if mother uses institutional child care
CK_informal	Indicator variable equal to 1 if mother uses informal child care
CK_formal	Indicator variable equal to 1 if mother uses formal child care
<b>Explanatory variables</b>	
age	Woman's age in years at the time of birth
educ	Woman's education or training in years
child1	Indicator variable equal to 1 if it is first birth, 0 otherwise
singl	Indicator variable equal to 0 if the woman is single, 1 otherwise
married	Indicator variable equal to 1 if the woman is married, 0 otherwise
coh	Indicator variable equal to 1 if the woman is cohabiting, 0 otherwise
origin	Indicator variable equal to 0 if mother is German, 0 otherwise
empl1_bef	Indicator variable equal to 1 if the woman works full-time before birth
empl2_bef	Indicator variable equal to 1 if the woman works full or part-time before birth
empl3_bef	Indicator variable equal to 1 if the woman works regular part-time before birth
matben	Maternity benefits
childnum	Number of children
CC_coverage	Child care coverage
<i>Income variables</i>	
labinc_bef	Woman labor earnings before the birth (yearly)
labinc_aft	Woman labor earnings after the birth (yearly)
wagegro_bef	Woman labor gross income before the birth (monthly)
wagegro_aft	Woman labor gross income after the birth (monthly)
wagenet_bef	Woman labor net income before the birth (monthly)
wagenet_aft	Woman labor net income after the birth (monthly)
housinc	Household income at the year of birth
<i>Partner characteristics</i>	
agem	Partner's age
educationm	Partners education or training in years
empl1m	Indicator variable equal to 1 if a partner works full-time at the birth year
labincm	Partners labor earnings at the year of birth
wagegrom	Partners labor gross income before the birth (monthly)
wagenetm	Partners labor net income before the birth (monthly)
<i>Other characteristics</i>	
east_west	Indicator variable equal to 1 if a household locates in West-Germany
region1-16	Indicator variable equal to 1 if a household locates in federal state i
pregion1-16	Interaction variable between policy and state
land	Categorical variable from 1 to 16 defining the federal state location

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 3.6: Bivariate probit estimation results for the employment during the first year of motherhood

	Full-time	Child care	Marginal effects	Part-time	Child care	Marginal effects	Total	Child care	Marginal effects
policy	0.127 (0.398)	-0.124 (0.115)	0.00179 (0.00613)	-0.650*** (0.215)	-0.127 (0.115)	-0.0591*** (0.0152)	-0.209 (0.256)	-0.128 (0.115)	-0.0305 (0.0333)
educ	0.133*** (0.0439)	-0.0127 (0.0254)	0.00174** (0.000855)	0.0838*** (0.0283)	-0.0133 (0.0254)	0.00922*** (0.00317)	0.107*** (0.0259)	-0.0132 (0.0254)	0.0159*** (0.00392)
age	0.284 (0.253)	0.0371 (0.109)	0.00373 (0.00344)	0.185 (0.140)	0.0308 (0.109)	0.0209 (0.0156)	0.195 (0.131)	0.0319 (0.109)	0.0296 (0.0195)
age2	-0.00416 (0.00391)	-0.000629 (0.00169)	-5.47e-05 (5.28e-05)	-0.00336 (0.00220)	-0.000515 (0.00170)	-0.000378 (0.000244)	-0.00335 (0.00204)	-0.000535 (0.00169)	-0.000509* (0.000305)
married	0.112 (0.212)	0.0758 (0.128)	0.00138 (0.00249)	-0.231 (0.142)	0.0775 (0.128)	-0.0274 (0.0189)	-0.120 (0.128)	0.0763 (0.128)	-0.0179 (0.0208)
child1	-0.567* (0.337)	-0.270* (0.158)	-0.00691 (0.00500)	-0.0128 (0.210)	-0.280* (0.157)	-0.00379 (0.0231)	-0.371** (0.186)	-0.279* (0.158)	-0.0557** (0.0249)
childnum	-0.148 (0.222)	-0.113* (0.0615)	-0.00196 (0.00301)	-0.143 (0.121)	-0.117* (0.0615)	-0.0169 (0.0133)	-0.192* (0.112)	-0.117* (0.0615)	-0.0299* (0.0165)
labinc_bef	1.35e-05* (7.75e-06)	-3.42e-06 (4.57e-06)	1.77e-07 (1.16e-07)	4.91e-06 (4.13e-06)	-3.67e-06 (4.56e-06)	5.17e-07 (4.64e-07)	4.04e-06 (4.52e-06)	-3.79e-06 (4.55e-06)	5.66e-07 (6.83e-07)
matben	8.42e-06 (3.05e-05)	5.65e-06 (1.90e-05)	1.11e-07 (4.04e-07)	-1.71e-06 (2.10e-05)	6.64e-06 (1.89e-05)	-1.36e-07 (2.35e-06)	2.46e-07 (1.90e-05)	6.41e-06 (1.89e-05)	1.05e-07 (2.87e-06)
CC_coverage	2.711** (1.139)	-0.296 (0.420)	0.0356* (0.0210)	0.529 (0.996)	-0.296 (0.421)	0.0565 (0.111)	1.809** (0.841)	-0.287 (0.421)	0.268** (0.126)
agem	0.0131 (0.0208)	0.00252 (0.0138)	0.000172 (0.000287)	0.0163 (0.0153)	0.00224 (0.0138)	0.00183 (0.00171)	0.0226 (0.0139)	0.00342 (0.0138)	0.00342 (0.00209)
educm	-0.111** (0.0454)	0.0233 (0.0242)	-0.00145* (0.000818)	-0.0318 (0.0269)	0.0233 (0.0242)	-0.00335 (0.00300)	-0.0651*** (0.0251)	0.0230 (0.0242)	-0.00952** (0.00377)
labincm	-2.19e-05*** (5.94e-06)	3.85e-06 (2.54e-06)	-2.87e-07** (1.19e-07)	1.56e-06 (2.46e-06)	3.86e-06 (2.55e-06)	2.05e-07 (2.74e-07)	-2.57e-06 (2.44e-06)	3.92e-06 (2.55e-06)	-3.44e-07 (3.70e-07)
east_west	0.275 (0.369)		0.00305 (0.00378)	0.706** (0.315)		0.0606*** (0.0210)	0.715*** (0.269)		0.0844*** (0.0250)
empl1_bef	1.211*** (0.293)	0.223 (0.159)	0.0317** (0.0149)		0.230 (0.158)	0.00179 (0.00135)		0.234 (0.158)	0.00236 (0.00170)
pempl1_bef	-1.125** (0.532)		-0.00586* (0.00300)						
empl3_bef				0.529*** (0.147)		0.0735*** (0.0247)			
pempl3_bef				0.293 (0.317)		0.0393 (0.0500)			
empl2_bef							0.634*** (0.168)		0.0894*** (0.0224)
pempl2_bef							-0.490 (0.305)		-0.0587** (0.0288)
Constant	-8.142** (4.129)	0.683 (1.694)		-5.467** (2.207)	0.791 (1.701)		-5.863*** (2.071)	0.773 (1.699)	
Observations	1,098	1,098		0.103			1,098	1,098	
rho	0.326 (0.232)						0.153 (0.103)		
se									

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Table 3.7: Bivariate probit estimation results for the employment during two years of motherhood

Dependent variables	Full-time	Child care	Marginal effects	Part-time	Child care	Marginal effects	Total	Child care	Marginal effects
policy	-0.103 (0.319)	-0.125 (0.115)	-0.00330 (0.00892)	-0.849*** (0.172)	-0.124 (0.115)	-0.141*** (0.0213)	-0.750*** (0.252)	-0.125 (0.115)	-0.160*** (0.0422)
educ	0.0768** (0.0364)	-0.0132 (0.0254)	0.00238* (0.00124)	0.0679*** (0.0231)	-0.0133 (0.0254)	0.0134*** (0.00473)	0.0832*** (0.0224)	-0.0133 (0.0254)	0.0201*** (0.00560)
age	0.0935 (0.190)	0.0323 (0.109)	0.00299 (0.00595)	0.0986 (0.107)	0.0324 (0.109)	0.0208 (0.0219)	0.0758 (0.104)	0.0323 (0.109)	0.0199 (0.0259)
age2	-0.00125 (0.00296)	-0.000546 (0.00169)	-4.01e-05 (9.29e-05)	-0.00161 (0.00167)	-0.000547 (0.00169)	-0.000341 (0.000341)	-0.00117 (0.00161)	-0.000544 (0.00169)	-0.000308 (0.000403)
married	0.202 (0.174)	0.0773 (0.128)	0.00578 (0.00460)	-0.234** (0.116)	0.0775 (0.128)	-0.0479* (0.0266)	-0.106 (0.111)	0.0776 (0.128)	-0.0237 (0.0288)
child1	-0.259 (0.300)	-0.278* (0.157)	-0.00822 (0.00864)	-0.0113 (0.160)	-0.280* (0.157)	-0.102 (0.0321)	-0.263* (0.149)	-0.279* (0.157)	-0.0728** (0.0348)
childnum	-0.223 (0.206)	-0.115* (0.0615)	-0.00721 (0.00639)	-0.0832 (0.0846)	-0.115* (0.0615)	-0.0200 (0.0171)	-0.142* (0.0835)	-0.115* (0.0615)	-0.0392* (0.0206)
labinc_bef	1.90e-05*** (6.33e-06)	-3.52e-06 (4.57e-06)	5.89e-07*** (2.21e-07)	9.17e-06*** (3.45e-06)	-3.56e-06 (4.56e-06)	1.76e-06** (7.10e-07)	7.50e-06* (3.97e-06)	-3.54e-06 (4.57e-06)	1.73e-06* (9.99e-07)
matben	2.57e-05 (2.45e-05)	6.32e-06 (1.89e-05)	8.18e-07 (8.01e-07)	3.74e-05** (1.64e-05)	6.47e-06 (1.89e-05)	7.75e-06** (3.34e-06)	4.33e-05*** (1.59e-05)	6.47e-06 (1.89e-05)	1.09e-05*** (3.99e-06)
CC_coverage	2.683*** (0.950)	-0.302 (0.420)	0.0833** (0.0365)	0.298 (0.781)	-0.301 (0.420)	0.0523 (0.158)	1.790** (0.733)	-0.301 (0.420)	0.432** (0.182)
agem	0.00350 (0.0189)	0.00238 (0.0138)	0.000114 (0.000595)	-0.00829 (0.0131)	0.00249 (0.0138)	-0.00161 (0.00268)	-0.00403 (0.0124)	0.00240 (0.0138)	-0.000911 (0.00309)
educm	-0.117*** (0.0380)	0.0236 (0.0242)	-0.00362** (0.00143)	-0.00697 (0.0220)	0.0236 (0.0242)	-0.000769 (0.00450)	-0.0403* (0.0215)	0.0236 (0.0242)	-0.00913* (0.00537)
labincm	-1.09e-05** (4.36e-06)	3.82e-06 (2.55e-06)	-3.32e-07** (1.43e-07)	3.16e-06 (2.02e-06)	3.81e-06 (2.55e-06)	7.44e-07* (4.13e-07)	1.57e-06 (1.96e-06)	3.82e-06 (2.55e-06)	5.24e-07 (4.92e-07)
east_west	-0.475 (0.299)		-0.0200 (0.0166)	0.0180 (0.237)		0.00363 (0.0476)	-0.0322 (0.223)		-0.00803 (0.0558)
empl1_bef	0.987*** (0.222)	0.228 (0.158)	0.0481*** (0.0177)		0.230 (0.158)	0.00601 (0.00415)		0.227 (0.159)	0.00782 (0.00533)
pempl1_bef	-0.920** (0.425)		-0.0140*** (0.00519)						
empl3_bef				0.585*** (0.123)		0.138*** (0.0331)			
pempl3_bef				0.356 (0.258)		0.0839 (0.0687)			
empl2_bef							0.696*** (0.140)		0.162*** (0.0306)
pempl2_bef							-0.0808 (0.284)		-0.0195 (0.0671)
Constant	-3.415 (3.029)	0.760 (1.697)		-3.015* (1.706)	0.758 (1.696)			0.762 (1.697)	
Observations	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098	1,098
rho	0.0488		-0.0295				-0.0153		
se	(0.127)		(0.0832)				(0.0796)		

Note: Standard errors in parentheses; \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

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