The Implicit and Explicit Design of Income Tax Systems: Empirical Essays on German Tax Policy

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Vorbemerkungen

Die vorliegende Dissertationsschrift wurde nach der Promotionsordnung des Fachbereichs Wirtschaftswissenschaft vom 16.07.2008 angefertigt. Die Dissertationsschrift wurde kumulativ nach der Ausführungsvorschrift für das kumulative Promotionsverfahren, welche der Promotionsausschuss des Fachbereichs Wirtschaftswissenschaft am 09.07.2008 verabschiedet hat, angefertigt.

Hierzu erkläre ich Folgendes:

1. Zu Beginn der Dissertationsschrift erfolgt eine zusammenhängende Darstellung (Exposé) der gesamten Thematik gemäß § 9 Abs. 2 Buchstabe b der Promotionsordnung vom 16.07.2008. Die zusammenhängende Darstellung enthält eine Einführung in die Problemstellung, erläutert die wesentlichen Forschungsfragen und fasst die grundlegenden Ergebnisse der Einzelbeiträge zusammen.
2. In die Einleitung wurde gemäß § 9 Abs. 2 Buchstabe b der Promotionsordnung vom 16.07.2008 eine tabellarische Übersicht aufgenommen, die den Anteil der Eigenleistung bei Artikeln, die in Ko-Autorenschaft entstanden sind, kenntlich macht.
3. Eingereichte und bereits veröffentlichte Fachartikel sind der Dissertation als Kopie beigefügt. Für noch nicht veröffentlichte Beiträge enthält die Dissertation die entsprechende Arbeitspapier- bzw. Manuskriptfassung.
4. Die eingereichten Fachartikel wurden entsprechend den Anforderungen gemäß Nr. 4 Buchstaben a bis c der Ausführungsvorschrift für das kumulative Promotionsverfahren vom 09.07.2008 ausgewählt.
5. Ich versichere, dass die Dissertation von mir selbstständig erstellt und der Eigenanteil bei Artikeln in Ko-Autorenschaft wahrheitsgemäß angegeben wurde. Die Arbeit hat keiner anderen Prüfungsbehörde vorgelegen.

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Exposé

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1. Einleitung

Die vorliegende Dissertationsschrift besteht aus vier in englischer Sprache verfassten Einzelbeiträgen, welche sich mit ausgewählten Fragen aus der Schnittmenge der Betriebswirtschaftlichen Steuerlehre und der Finanzwissenschaft beschäftigen. Tabelle 1 enthält eine Übersicht über die Einzelbeiträge dieser Dissertationsschrift sowie Angaben über Ko-Autorenschaften und Informationen zur Veröffentlichung.

Nummer	Titel	Ko-Autoren	Eigener Anteil	Zeitschrift, Fundstelle
1	The demand for tax preparation services: Empirical evidence from Germany	Eichfelder, Sebastian; Hechtner, Frank; Sielaff, Christian	25%	DBW 72 (6) (2012), S. 525 – 554.
2	Charitable Giving in the German Welfare State: Fiscal Incentives and Crowding Out	Bönke, Timm; Sielaff, Christian	33%	Public Choice 154 (1) (2013), S. 39-58
3	Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany	Werdt, Clive	50%	Diskussionsbeitrag des Fachbereichs Wirtschaftswissenschaft (FACTS), Freie Universität Berlin, Nr. 2012/22
4	The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour - An experimental analysis	---	100%	Diskussionsbeitrag des Fachbereichs Wirtschaftswissenschaft (FACTS), Freie Universität Berlin, Nr. 2013/1

Tabelle 1 - Übersicht über die Einzelbeiträge

Tabelle 2 gibt einen Überblick über die Einordnung und Abgrenzung der vier Einzelbeiträge dieser Dissertationsschrift anhand thematischer und methodischer Kriterien.

Beitrag	Thema	Methode	Untersuchungs-design	Untersuchungs-gegenstand
The demand for tax preparation services: Empirical evidence from Germany	Empirische Steuer-wirkungs-lehre	Empirie (Heckman Selection Model)	Datenanalyse: Querschnitt	Steuerliche Belastungs-wirkung
Charitable Giving in the German Welfare State: Fiscal Incentives and Crowding Out		Empirie (Quantils-regression)	Datenanalyse: Querschnitt	Steuerliche Begünstigungs-norm
Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany		Empirie (IV-regression)	Datenanalyse: Längsschnitt	Analyse einer Einkommen-steuerreform
The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour An experimental analysis		Empirie (Varianz-analyse)	Experiment: Querschnitt	Steuerliche Begünstigungs-norm

Tabelle 2 - Einordnung und Abgrenzung der Einzelbeiträge

Im Mittelpunkt dieser Dissertationsschrift steht die Darstellung, Beschreibung und Erklärung ökonomischer Verhaltensweisen vor dem Hintergrund verschiedener Dimensionen der Einkommensbesteuerung.

Die Wirtschaftswissenschaft befindet sich im Umbruch und damit das mit ihr verankerte Selbstverständnis. Das in der wirtschaftswissenschaftlichen Literatur bestehende Bild eines allwissenden, umfänglich informierten und im streng ökonomischen Sinn rational handelnden Zensiten stellt nach wie vor den Kern wirtschaftswissenschaftlicher Forschung dar. Gleichwohl hat sich in den letzten Jahren die Erkenntnis etabliert, dass die restriktiven formallogischen akademischen Annahmen bezüglich der kognitiven Beschaffenheit von Individuen und der daraus resultierenden Vorhersagbarkeit ihres Verhaltens einer strengen Prüfung hinsichtlich ihrer empirischen Beobachtbarkeit zu unterziehen sind. Der drastischen Auffassung von Congden et. (2009) folgend, habe sich die Unterstellung eines Homo

oeconomicus zu häufig als unzureichend erwiesen und sich seiner empirischen Legitimation nahezu beraubt.[1]

Welcher Auffassung eher zu folgen ist und für fruchtbarer im Sinne eines Erkenntnisgewinns gehalten wird, ist weniger eine Frage wissenschaftlicher Ideologie sondern m. E. abhängig von der zugrundeliegenden Forschungsfrage und dem verfügbaren Datenmaterial. Die vier nachfolgend aufgeführten Forschungsbeträge sollen den Spagat zwischen einer Orientierung an der jeweiligen etablierten Modelltheorie und der Beobachtbarkeit sowie Anwendbarkeit dieser theoretischen Überlegungen in der fiskalpolitischen Realität vollziehen.

Der erste Forschungsbeitrag widmet sich unter Verwendung des Taxpayer Panels der Analyse einer Einkommensteuerreform. Es wird untersucht, wie die deutschen Einkommensteuerreformen der Jahre 2004 und 2005 auf die Höhe des deklarierten zu versteuernden Einkommens der Steuerpflichtigen gewirkt haben. Gemessen werden die einkommensteuerlichen Entlastungen und die individuellen Verhaltensanpassungen durch das Maß der Elastizität des zu versteuernden Einkommens in Abhängigkeit von der Nachsteuergrenzrate. Das Ziel dieses Forschungsbeitrages ist die Beantwortung der Frage, ob die Steuerpflichtigen in ausreichendem Maß auf steuerliche Anreize reagiert haben, um diese Einkommensteuerreform als finanzierungsneutral bzw. aufkommensneutral bezeichnen zu können. Hier ist insbesondere die Unterscheidung von kurz- und langfristigen Elastizitäten von Bedeutung, um einmalige Mitnahmeeffekte im Rahmen der individuellen Steuerplanung von dauerhaften Verhaltensänderungen im Sinne eines tatsächlichen Einkommenswachstums und seiner steuerlichen Deklaration unterscheiden zu können.

Der zweite Beitrag verwendet einen aus dem in § 32 a EStG kodifizierten Einkommensteuertarif ableitbaren Spendenpreis, welcher ebenfalls mit der individuellen Nachsteuergrenzrate bestimmt werden kann. Als Datengrundlage dienen drei repräsentative Querschnittsdatensätze, die aus den Einkommensteuerstatistiken der Jahre 1998, 2001 und 2004 generiert wurden. Die steuerliche Begünstigungsnorm zum Spendenabzug im Sinne des § 10b EStG wird hinsichtlich ihrer fiskalischen Auswirkungen untersucht. Im Mittelpunkt

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[1] So zeigt *Ramsey* (1927) modelltheoretisch, dass Steuerpflichtige keinen Verhaltensunterschied hinsichtlich der Wahrnehmung von Steueränderungen bzw. Preisänderungen aufweisen dürften. Dieser Auffassung folgen die Beiträge von *Harberger* (1964), *Mirrlees* (1971), *Atkinson/Stiglitz* (1976). Ein differenzierteres Bild zeichnen Arbeiten zur tatsächlichen Wahrnehmung der Besteuerung. Mittlerweile ist es unstrittig, dass die Dimension der Einkommensbesteuerung hohe Ansprüche an die kognitive Leistungsfähigkeit der Zensiten stellt. Hierzu finden sich zahlreiche wirtschaftswissenschaftliche Belege wie u. a. die Aufsätze von *Schmölders* (1960), *Hundsdoerfer* und *Sichtmann* (2007), *Kirchler* (2007), *Blaufus* und *Ortlieb* (2009), *Cogden et al.* (2009), *Alm (2010), Sielaff (2011)* und *Massarrat und Sielaff (2012)* zeigen.

dieser Untersuchung steht die Frage, ob und inwieweit sich diese Begünstigungsnorm unter der Berücksichtigung staatlicher Subventionen für gemeinnützige Einrichtungen fiskalpolitisch rechtfertigen lässt.

Die Nachfrage nach Steuerberatungskosten wird im dritten Beitrag beleuchtet und stellt je nach Betrachtungsweise einen vor-, gleich-, oder nachgeschalteten Prozess in der Einkommensbesteuerung dar. Die Verwendung der oben genannten Maße unterstellt implizit, dass die einkommensteuerliche Tarifkomplexität kein Hindernis bei der Berechnung des eigenen Durchschnitts- und Grenzsteuersatzes darstellt. Die empirisch bestimmten Elastizitäten können somit nur dann als valide erachtet werden, wenn angenommen werden kann, dass die Steuerpflichtigen über ausreichende Kenntnisse hinsichtlich der eigenen durch das EStG zugewiesenen Leistungsfähigkeit und somit der Grenz- und Durchschnittssteuerbelastung verfügen. Die Identifikation der Steuerpflichtigen, die Steuerberatungsleistungen nachfragen, liefert einen wichtigen Hinweis darauf, bei welchen Steuerpflichtigen die Vorhersagekraft der oben genannten finanzwissenschaftlichen Konzepte höher sein dürfte. Dieser Aufsatz ergänzt die beiden erstgenannten Beiträge durch die Messung der Determinanten, welche die Nachfrage nach Steuerberatungskosten bestimmen.

Der vierte Beitrag stellt eine Zäsur dar. Er unterscheidet sich in seiner methodologischen Konzeption von den übrigen Beiträgen. Nachdem bei den drei zuvor genannten Beiträgen verschiedene Sekundärstatistiken als Datenquelle zur Verfügung standen, stand nun die Planung und Durchführung eines wirtschaftswissenschaftlichen Experiments sowie die eigenständige Erhebung und anschließende Auswertung von Daten im Mittelpunkt. Stichhaltige Argumente für die Nutzung von Experimenten in der Wirtschaftswissenschaft lassen sich seit den späten 1980er Jahren finden.[2] Im Mittelpunkt des „Real-Effort"-Experimentes steht die Frage, wie das Konzept der nachgelagerten Besteuerung auf das Investitionsverhalten von Steuerpflichtigen wirkt. Dabei ist die Allokationsentscheidung der Zensiten von besonderem Interesse, wie viel des zuvor erarbeiteten Lohnes auf zwei unterschiedlich riskante Anlagemöglichkeiten aufgeteilt wird und welche Gesamtvarianz das nachgefragte Portfolio aufweist. Die Modellierung vier verschiedener Steuersysteme mit unterschiedlicher Transparenz erlaubt die Überprüfung, welche steuerlichen Anreize besonders effektiv bei der Stimulation der Bereitschaft zur Risikoübernahme von Steuerpflichtigen sind.

[2] Vgl. Smith (1987) und Alm (2010).

Die vier vorgestellten empirischen Untersuchungen widmen sich mannigfaltigen Facetten der deutschen Einkommensbesteuerung von natürlichen Personen. Im folgenden Kapitel wird diese Dissertationsschrift thematisch in die bisherige Forschung eingebettet, bevor im Anschluss daran die Einzelbeiträge hinsichtlich der Forschungsfrage, der Methodik und des Erkenntnisgewinns detailliert dargestellt werden.

2. Thematische Einordnung der Forschungsbeiträge anhand der verschiedenen Forschungsziele

Die wissenschaftliche Disziplin Betriebswirtschaftliche Steuerlehre vereinigt Fragestellungen der Rechts- und Finanzwissenschaften sowie der Betriebswirtschaftslehre.[3] *Hundsdoerfer/Kiesewetter/Sureth* (2008) identifizieren vier Forschungsziele der Betriebswirtschaftlichen Steuerlehre: (1) Die Steuerbelastungsmessung untersucht eine rechtliche und oder wirtschaftliche Belastung der Zensiten durch vergangene, gültige oder zukünftige isolierte oder kombinierte Besteuerungsnormen.[4] (2) Die modellgestützte Steuerplanungslehre setzt sich zum Ziel, Handlungsempfehlungen an Unternehmer[5] auszusprechen. (3) Die Steuerrechtsgestaltungslehre sieht die Legislative als Adressaten für Empfehlungen bezüglich der Aus- und Umgestaltung des herrschenden Steuerrechts. (4) Die empirische Steuerwirkungslehre hat sich erst in den letzten Jahren als vielversprechender Forschungsbereich etabliert.[6] Im Mittelpunkt steht die Überprüfung von Steuerwirkungen mittels empirischer, meist quantitativer Methoden. Der Einsatz statistischer und ökonometrischer Verfahren erlaubt es, Informationen über die tatsächlichen Verhaltens-anpassungen von Steuerpflichtigen als Reaktion auf die Besteuerung zu gewinnen. Dieses Wissen ist von hoher praktischer wie wissenschaftlicher Relevanz, um die überwiegend theoriebasierten Vorhersagen über die Wirkungsweise von Steuern auf menschliches Verhalten zu bestätigen oder zu einer Verbesserung der Modelltheorie durch die Anpassung an das tatsächliche, weil beobachtbare Verhalten beizutragen. Die Bildung einer ökonomischen Theorie bildet gemeinsam mit ihrer empirischen Verifizierung einen

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[3] Die Betriebswirtschaftliche Steuerlehre selbst wird dabei nach herrschender Auffassung als Teildisziplin der Allgemeinen Betriebswirtschaftslehre gesehen. Vgl. *Jacobs* (2004), S. 251.

[4] Detaillierte Ausführungen zum Begriff der Steuerbelastungsmessung finden sich bei *Schneider* (2002), S. 10f.

[5] *Hechtner* (2010, S. 14) diskutiert, ob und inwieweit natürliche Personen dem Begriff „Unternehmer“ für wissenschaftliche Fragestellungen zuzuordnen sind.

[6] Vgl. *Wagner* (2004), S. 243f.

fließenden Prozess, welcher nicht zwingend im strengen Sinne die nachträgliche Überprüfung von zuvor aus der Theorie abgeleiteten Hypothesen vorsieht.[7]

Auch wenn die oftmals gängige Annahme ökonomischer Modelle (noch) vorrangig davon ausgeht, dass die korrekte Berechnung der individuellen Steuerbelastung die Zensiten vor keine oder höchstens geringfügige Probleme stellt, scheinen neuere Forschungszweige in der Betriebswirtschaftlichen Steuerlehre eine empirische Überprüfung dieser Annahme zu verfolgen.[8] Diese Vorgehensweise ist aus wissenschaftlicher Sicht zu befürworten und damit zu begründen, dass die Sammlung empirischer Evidenz zu einer Adjustierung und/oder Erweiterung der Modelltheorie führen kann und somit zur Erhöhung des Wissens in der Betriebswirtschaftlichen Steuerlehre beiträgt.[9] Aus steuerpolitischer Sicht ist der empirische Forschungszweig der Betriebswirtschaftlichen Steuerlehre einer quantitativen wie qualitativen Verdichtung würdig, da der öffentliche Diskurs eine höhere Prognosequalität bei der Bewertung von Fiskalpolitik erfährt.

Die wissenschaftliche Weiterentwicklung der empirischen Steuerwirkungslehre verschreibt sich zunehmend der Interdisziplinarität. So können in Bezug auf das Untersuchungsdesign und die Fragestellung Beziehungen zu verwandten Disziplinen hergestellt werden.[10] Die einzelnen Beiträge dieser Dissertationsschrift erweitern den Bereich der empirischen Betriebswirtschaftlichen Steuerlehre. Es werden verschiedene Dimensionen der Einkommensbesteuerung untersucht, um Entscheidungs- und Verhaltenswirkungen der Zensiten zu beobachten und abzuleiten.

Die ersten drei Beiträge sind auf für wissenschaftliche Forschung zur Verfügung gestellte Stichproben der Einkommensteuerstatistiken gestützt, wohingegen der letzte Beitrag selbst erhobene Daten im Rahmen eines Experiments auswertet. Methodisch unterscheiden sich die Einzelbeiträge durch die Anwendung verschiedener statistischer und ökonometrischer Verfahren bei der Beantwortung der jeweiligen Forschungsfrage. Der erste Einzelbeitrag bedient sich der Schätzung mittels Instrumentenvariablen, um auf Basis von Längsschnittsdaten der Veranlagungsjahre 2001-2006 die fiskalischen Auswirkungen der Einkommensteuerreform zu bestimmen. Der zweite Beitrag approximiert das Nachfrageverhalten von Individuen nach Steuerberatungsleistungen in der Höhe und in der

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7 Vgl. *Westermann* (2000), S. 31f.

8 Vgl. *Hechtner* (2010), S. 1.

9 Vgl. exemplarisch *Hundsdoerfer/Sichtmann* (2009).

10 Es sei hier auf die Ausführungen von *Blaufus et al.* (2009) verwiesen.

Wahrscheinlichkeit anhand von zwei verschiedenen Wahrscheinlichkeitsmodellen. Der dritte Aufsatz basiert auf dem nichtparametrischen Verfahren der Quantilsregression, um das Spendenverhalten von Steuerpflichtigen in Abhängigkeit der tatsächlichen Spendenhöhe zu quantifizieren. Dieses Verfahren gestattet es, spezifische Aussagen für die heterogene Grundgesamtheit der spendenden Bevölkerung hinsichtlich der Sinnhaftigkeit von staatlichen Subventionen für Spendenbeiträge zu treffen. Die Auswertung eines wirtschaftswissenschaftlichen Experiments erfolgt im vierten Beitrag durch das statistische Verfahren der (Ko-)Varianzanalyse. Dieses Verfahren ermöglicht es, die in vier Gruppen eingeteilten Probanden hinsichtlich ihres riskanten Investitionsverhaltens unter Berücksichtigung von verschiedenen Faktoren und Kontrollvariablen zu kategorisieren.

Die Anwendung der verschiedenen Analyseinstrumente belegt damit einerseits die Notwendigkeit, die vielfältigen Forschungsfragen der Betriebswirtschaftlichen Steuerlehre durch probate quantitative Verfahren zu beantworten. Andererseits zeigt sich, dass das zur Verfügung stehende Datenmaterial einen interdisziplinären Ansatz in der Betriebswirtschaftlichen Steuerlehre begünstigt und somit zur Evolution dieser Disziplin beiträgt.

Die in der vorliegenden Dissertationsschrift enthaltenen Einzelbeiträge unterscheiden sich aufgrund der untersuchten Forschungsfragen sowohl in ihrer Methodik als auch durch die inhaltlichen Schwerpunkte. Letztere können allesamt dem Forschungsbereich der empirischen Steuerwirkungslehre bzw. der empirischen Finanzwissenschaft zugeordnet werden. Der Fokus liegt dabei auf der Einkommensbesteuerung von natürlichen Personen. Obwohl die jeweiligen Forschungsfragen unterschiedliche Dimensionen der Einkommensbesteuerung adressieren, kann ein vereinendes Element in den individuellen und aggregierten Verhaltensanpassungen gesehen werden, welche aufgrund von expliziten und impliziten Einkommensteuersystemgestaltungen durch den fiskalpolitischen Planer hervorgerufen werden. Im Sinne einer optimalsteuertheoretischen Sichtweise ist der fiskalpolitische Planer daran interessiert ein vorgegebenes Steueraufkommen durch die verschiedenen Komponenten des Besteuerungsprozesses möglichst effektiv zu erzielen.[11] Die inhaltliche Schnittmenge der Einzelbeiträge umfasst somit den isoliert betrachteten Einfluss besteuerungschronologischer Sachverhalte und ihrer Modifikation auf die Ermittlung der einkommensteuerlichen Bemessungsgrundlage. Die Verhaltensanpassung eines Zensiten bei der Ermittlung seiner

[11] Homburg (2010), S. 157.

einkommensteuerlichen Bemessungsgrundlage als Reaktion auf (un)gewollte Änderungen innerhalb eines Steuersystems durch den Gesetzgeber kann nur dann vernünftig quantifiziert werden, wenn bekannt ist oder plausibel unterstellt werden kann, ob besteuerungsrelevante Informationen überhaupt in den Entscheidungsprozess eines Zensiten einfließen, welche Informationen zugänglich wie valide sind und woher die Informationen stammen.

Als gleichzeitiger Start- und Endpunkt des individuellen Besteuerungsprozesses kann die Nachfrage nach bzw. das Vorhandensein von Steuerberatungsleistungen aus dem ersten Beitrag gesehen werden. Einerseits wirken sich die deklarierten Steuerberatungsleistungen unmittelbar auf die Höhe der einkommensteuerlichen Bemessungsgrundlage aus, andererseits weisen sie auf das Vorhandensein eigener oder fremdbezogener steuerrechtlicher Expertise hin. Sie sind ferner ein Indiz für die Sensibilisierung des Steuerpflichtigen bei der Ausübung von Wahlrechten und Ermessensspielräumen im Bereich der Bemessungsgrundlagenermittlung. Ferner kann zudem mehr Kenntnis hinsichtlich der eigenen einkommensteuerlichen Belastung sowie über die einkommensteuerplanerischen Möglichkeit unterstellt werden. Der zweite Beitrag beleuchtet die Reagibilität der Steuerpflichtigen in Bezug auf ihr besteuerungsrelevantes und besteuerungssensibles Spendenverhalten, welches wiederum ein Element des gesamten Deklarationsverhaltens darstellt. Dessen einkommensteuerlich induzierte Volatilität steht im Mittelpunkt des dritten Beitrages. Die beiden zuletzt genannten Verhaltenskanäle können somit in unmittelbare Beziehung zueinander gesetzt werden. Zudem werden sie maßgeblich durch die Nachfrage nach Steuerberatungsleistungen gesteuert. Der vierte Beitrag widmet sich der Transparenz von Einkommensteuersystemen, indem die beiden Komponenten der Arbeitseinkommensbesteuerung sowie der Kapitaleinkommensbesteuerung analysiert werden. Die Transparenz von Besteuerungsvorschriften innerhalb eines Steuersystems ist wiederum ein wesentlicher Faktor, der die Nachfrage nach Steuerberatungsleistungen und somit mittelbar das Deklarationsverhalten eines Steuerpflichtigen implizit prädeterminiert.

Nachdem die Beiträge inhaltlich in ein sinnvolles, weil interdependentes Verhältnis gesetzt wurden, stellt der folgende Abschnitt die Einzelbeiträge hinsichtlich der konkreten Forschungsfrage und den gewonnenen Erkenntnissen genauer dar.

3. Forschungsfragen der Einzelbeiträge

3.1 Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany

Dieser Beitrag quantifiziert die Verhaltensanpassungen von Steuerpflichtigen als Reaktion auf die Einkommensteuerreformen in Form von Tarifsenkungen, welche in den Jahren 2004 und 2005 in Deutschland umgesetzt wurden. Die Verhaltensreaktion wird durch das (steuerdefinitorische) Einkommenswachstum gemessen. Im Mittelpunkt der Untersuchung steht die Schätzung der Elastizität des zu versteuernden Einkommens. Sie stellt ein Aggregat verschiedener individueller Verhaltensdimensionen dar und hat sich als zentraler fiskalischer Parameter bei der Bewertung von Einkommensteuerreformen etabliert.[12]

Unsere Vorgehensweise weicht im Wesentlichen durch zwei Modifikationen von der großen Mehrheit vorheriger Beiträge ab:

(1) Die in der Literatur weit verbreitete Methode von Gruber & Saez (2002) sieht lediglich die Schätzung eines unbekannten Elastizitätsparameters vor, welche keine Unterscheidung zwischen verschiedenen zeitlichen Dimensionen individueller Reaktionen auf eine Einkommensteuerreform gestattet. Die beiden deutschen Beiträge von Gottfried & Witczak (2009) sowie Müller & Schmidt (2012) verwenden beispielsweise diesen Ansatz. Den Ideen von Saez et. al (2012) sowie Holmlund & Söderström (2011) folgend, verwenden wir ein dynamisches Schätzverfahren, um zwischen einmaligen und permanenten Verhaltensanpassungen der Steuerpflichtigen unterscheiden zu können.[13] Diese Differenzierung ist von Interesse, um die kurz- und langfristigen Effekte auf das individuelle Einkommenswachstum bestimmen zu können. Für die Beurteilung, ob eine Einkommensteuerreform die oftmals propagierten gewünschten positiven Wirkungen auf das Wachstums des zu versteuernden Einkommens besitzt oder zumindest aufkommensneutral ausgestaltet ist, wird die dauerhafte Komponente einer Verhaltensanpassung der Steuerpflichtigen in Form einer langfristigen Elastizität des zu versteuernden Einkommens verwendet. Kurzfristige Effekte implizieren hingegen lediglich Mitnahmeeffekte der Steuerpflichtigen.

(2) Das Maß der Elastizität des zu versteuernden Einkommens basiert auf einer steuerrechtlichen Einkommensdefinition. Chettys Bedenken (2009), ob ausschließlich dieses

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[12] Vgl. Feldstein (1995, 1999).

[13] Slemrod (1998) weist ebenfalls auf die Notwendigkeit hin, die unterschiedlichen zeitlichen Dimensionen der Verhaltensreaktion auf Einkommensteuerreformen zu quantifizieren.

Maß für die Bestimmung der durch die Einkommensbesteuerung entstehende Zusatzlast geeignet ist, wird Rechnung getragen, indem auch alternative Einkommenskonzepte verwendet werden, welche sich stärker an ökonomischen Kriterien orientieren, um „reale“ Verhaltensanpassungen bestimmen zu können.

Als Datenbasis dient das German Taxpayer Panel, welches alle relevanten Informationen für den Prozess der Einkommensbesteuerung enthält. Das Panel erfasst derzeit die Steuerpflichtigen der Jahre 2001 bis 2006 und enthält für jedes Veranlagungsjahr 19 Millionen Einkommensteuererklärungen. Auf Basis einer für wissenschaftliche Fragestellungen zur Verfügung gestellte 5%ige Stichprobe analysieren wir die Einkommenswachstumseffekte einer umfänglichen Einkommensteuertarifsenkung in den Jahren 2004 und 2005.

Die Ergebnisse dieses Beitrags zeigen, dass es substantielle Unterschiede zwischen einer einmaligen unmittelbaren Mitnahmereaktion und einem dauerhaft positiven aber moderaten Effekt auf das zu versteuernde Einkommen gibt. Die Analyse belegt, dass langfristige Verhaltenanpassungen in viel geringerem Ausmaß zu beobachten sind als kurzfristige Reaktionen. Des Weiteren zeigen separate Schätzungen für einzel- und zusammenveranlagte Steuerpflichtige, dass die Einkommensteuerreform unterschiedliche Auswirkungen auf den erzielten Einkommenszuwachs und damit die Reagibilität der beiden Gruppen hat. Unser Beitrag zeigt zudem auf, dass die Beantwortung der Frage, welche fiskalischen Konsequenzen eine Senkung des Einkommensteuertarifs aufweist, maßgeblich von dem zugrundeliegenden Einkommenskonzept und der Berücksichtigung des oberen Randes der Einkommensverteilung abhängt.

Insgesamt versucht dieser Beitrag den neueren Strömungen dieses Forschungszweiges gerecht zu werden, indem das Reaktionsverhalten der Steuerpflichtigen differenzierter empirisch überprüft wird, als dies in der Vergangenheit möglich und üblich war.

3.2 Charitable Giving in the German Welfare State: Fiscal Incentives and Crowding Out

Bei der Ermittlung des zu versteuernden Einkommens stellt der Abzug von Sonderausgaben eine wesentliche Möglichkeit dar, die Einkommensteuerschuld zu senken. Gemäß § 10b EStG ist es gestattet, Spenden und Mitgliedsbeiträge zur Förderung steuerbegünstigter Zwecke als Sonderausgaben unter Beachtung bestimmter Kriterien von der Bemessungsgrundlage der Einkommensteuer abzuziehen. Der Beitrag untersucht auf Basis der drei verfügbaren faktisch

anonymisierten Einkommensteuerstatistiken der Veranlagungsjahre 1998, 2001 und 2004, ob das geltende System der steuerlichen Behandlung von Spenden aus fiskalpolitischer Sicht fortzuführen ist. Die Gewährung des Sonderausgabenauszugs kann gerechtfertigt werden, wenn der aggregierte Verlust an Steuereinnahmen für den Staat aufgrund des Spendenabzugs durch den Zuwachs an Spendenaufkommen selbst überkompensiert wird. Als Maß für die fiskalische Rechtfertigung des Spendenabzugs gilt hierbei die durchschnittliche Elastizität des Spendenbetrags in Abhängigkeit des aus dem Einkommensteuertarif ableitbaren Spendenpreises. Reagiert der Spendenbetrag auf eine einprozentige Veränderung des Spendenpreises unelastisch, so lautet die fiskalpolitische Empfehlung, dass die steuerliche Begünstigung des Spendenabzugs nicht gewährt werden sollte. Im umgekehrten Fall wäre hingegen die Beibehaltung des geltenden Systems vorteilhaft.

Zusätzlich quantifiziert dieser Beitrag, ob eine Erhöhung von staatlichen Ausgaben für wohltätige bzw. gemeinnützige Zwecke in einem Spenden-Crowding-Out bei privaten Spendern resultiert. Es kann von einem Crowding-Out gesprochen werden, wenn öffentliche Ausgaben private Spender verdrängen, indem Letztere einen Zuwachs an direkten staatlichen Ausgaben für förderungswürdige Zwecke zum Anlass nehmen, ihre private Spendentätigkeit zu senken. Zu diesem Zweck wurde auf Statistiken des Statistischen Bundesamtes zurückgegriffen, welche auf Ebene der Bundesländer detaillierte Informationen bezüglich der Ausgaben für gemeinnützige bzw. wohltätige Zwecke enthalten, und anschließend mit der Einkommensteuerstatistik verknüpft.

Methodisch bedient sich der Beitrag der Quantilsregression.[14] Sie erlaubt eine differenzierte Schätzung der Preis-, Einkommens- und Crowding-Out-Elastizitäten. Mittels der Quantilsregression können Aussagen über das Spendenverhalten gezielt für verschiedene Punkte der zugrunde liegenden Spendenverteilung in Abhängigkeit von der individuellen Spendenhöhe getroffen werden. Dieses Vorgehen bietet den Vorteil, dass das Spendenverhalten in Abhängigkeit von der jeweiligen Spendenhöhe analysiert und bewertet werden kann. Diese Vorgehensweise stellt für die Untersuchung des Spendenverhaltens in Deutschland ein Novum dar.[15]

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[14] Detaillierte Informationen zur Quantilsregression finden sich bei *Chernozhukov/Hong* (2002).

[15] Ein ähnliches Vorgehen findet sich für Frankreich bei *Fack/Landais* (2010). Einen Überblick über die Ergebnisse ähnlicher Untersuchungen aus anderen Ländern und mit diversen anderen Methoden findet sich bei *Peloza/Steel* (2005).

Die Ergebnisse belegen, dass bei Nichtberücksichtigung eines Spenden-Crowding-Outs die Mehrheit der Spender preisunelastisch auf eine Veränderung des Spendenpreises reagiert. In diesem Fall kann die steuerliche Spendenabzugsfähigkeit nicht gerechtfertigt werden. Wird dieses Ergebnis jedoch um die gefundenen Crowding-Out-Effekte erweitert, so lässt sich die Spendenbegünstigung aus fiskalpolitischer Sicht rechtfertigen. Der Gesamteffekt impliziert eine preiselastische Reaktion für alle Quantile der Spendenverteilung. Neben dem in diesem Beitrag wesentlichen Argument der fiskalischen Effektivität werden weitere Gründe angesprochen, die die Beibehaltung des geltenden Systems befürworten (können).

3.3 The demand for tax preparation services – Evidence from German non-business taxpayers

In der finanzwissenschaftlichen Literatur herrscht ein reges Interesse an den Faktoren, welche für die Nachfrage nach Steuerberatungsleistungen relevant sind.[16] Dieses Interesse begründet sich vor allem durch drei Aspekte. Zunächst kann festgestellt werden, dass Steuerberatungsleistungen einen wichtigen und umsatzstarken Sektor in der Dienstleistungsbranche darstellen. Ferner prägt die Nachfrage nach Steuerberatungsleistungen das ökonomische Verhalten von Steuerpflichtigen und sensibilisiert die Zensiten für die eigene Steuerplanung. Des Weiteren lässt sich die Nachfrage nach Steuerberatungsleistungen als Strategie interpretieren, um der Komplexität eines Steuersystems und seiner Gestaltungsspielräume gewahr zu werden.[17]

Dieser Beitrag untersucht die Determinanten der Nachfrage nach Steuerberatungsleistungen auf Basis der faktisch anonymisierten Einkommensteuerstatistik des Jahres 2004. Dieser Querschnittsdatensatz enthält auf Ebene der Steuerpflichtigen Informationen über die als Sonderausgaben deklarierten Beratungskosten gem. § 10 I Nr. 6 EStG des Jahres 2004. Da Steuerberatungsleistungen auch als Betriebsausgaben bzw. Werbungskosten abzugsfähig sind, beschränken wir unsere Analyse auf Steuerpflichtige mit nichtunternehmerischen Einkünften, um etwaigen Identifikationsproblemen und/oder Messfehlern vorzubeugen. Das ökonometrische Vorgehen konzentriert sich sowohl auf die Beantwortung der Frage, mit welcher Wahrscheinlichkeit Steuerpflichtige Steuerberatungsleistungen nachfragen, als auch welchen Betrag sie für die Beratungsleistungen aufwenden.

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[16] Vgl. *Slemrod und Sorum* (1984), *Collins et al.* (1990), *Mauldin et. al.* (2002).

[17] Vgl. *Slemrod* (1989) sowie *Eichfelder und Schorn* (2012).

Unsere Ergebnisse identifizieren vor allem demografische Merkmale wie das Alter eines Steuerpflichtigen sowie das Vorhandensein von Kindern als wesentliche Faktoren, die die Nachfrage nach Steuerberatungsleistungen beeinflussen. Bezug nehmend auf steuerrechtliche Charakteristika weist unsere Analyse den kapitalintensiven Einkunftsarten ein starkes Gewicht zu. Das Vorhandensein von Kapitalerträgen – insbesondere Dividenden – sowie Miet- und Pachteinkünften wirkt sich signifikant positiv auf die individuelle Nachfrage nach Steuerberatungsleistungen aus. Ferner können wir zeigen, dass das Vorhandensein von negativen Einkünften grundsätzlich zu einem anderen Nachfrageverhalten führt. Dieses Resultat lässt sich durch das höhere Maß an Befolgungskosten, steuerliche Risiken und ein ausgeprägtes Steuerplanungspotenzial erklären.

Obwohl die Analyse auf Haushalte mit ausschließlich nichtunternehmerischen Einkünften beschränkt ist, liefert dieser Beitrag wertvolle Erkenntnisse, welche (steuerlichen) Charakteristika der Zensiten die Nachfrage nach Beratungsleistungen beeinflussen. Zudem implizieren unsere Ergebnisse, dass Steuerberater in der Lage sind, Preisdiskriminierung innerhalb ihres Mandantenkreises zu betreiben. Die Vermutung liegt nahe, dass sie ihren Ermessensspielraum unter Anwendung der bestehenden Gebührenordnung bei der Beratung von Beziehern hoher Einkünfte zu ihrem Vorteil ausschöpfen.

3.4. The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour - An experimental analysis

Dieser Beitrag analysiert, ob und wie sich die Besteuerungsformen der Arbeitseinkommen auf die individuelle Bereitschaft der Risikoübernahme von Steuerpflichtigen bei ihrer Investitionsentscheidung auswirken. Dazu wurde ein zweistufiges betriebswirtschaftliches Experiment durchgeführt. In einem ersten Schritt wird ein realitätsnahes Umfeld geschaffen, in der die Teilnehmer unter Setzung monetärer Anreize mit einer Arbeits-Freizeitentscheidung konfrontiert wurden, bei der sie sowohl über ihre Arbeitszeit als auch die Arbeitsintensität entscheiden konnten. Der daraus resultierende Bruttolohn unterlag im weiteren Verlauf des Experiments der Besteuerung und konnte anschließend auf zwei unterschiedlich riskante Finanzinvestitionsobjekte aufgeteilt werden. Jeder der 96 Teilnehmer bekam daher detaillierte Erläuterungen über ein für ihn geltendes Steuersystem, welches sowohl Informationen über die Arbeitseinkommensbesteuerung als auch die in einem zweiten Schritt anfallenden Regelungen zur Investitionsbesteuerung enthielt. Auf Ebene des Bruttolohnes wurde zwischen unmittelbarer und nachträglicher Besteuerung des Bruttolohns

unterschieden, wohingegen die Investitionserträge entweder vollständig der Steuer zu unterwerfen waren oder steuerfrei vereinnahmt werden konnten. Die Kombination beider Merkmale bietet die Möglichkeit, riskante ökonomische Entscheidungen unter Gültigkeit verschiedener Besteuerungssysteme zu überprüfen und miteinander zu vergleichen.

Der Beitrag entwickelt einen eigenen Ansatz, um die Risikofreudigkeit von Steuerpflichtigen zu quantifizieren, wenn das Zusammenspiel der Besteuerung von bekanntem Arbeitseinkommen und unsicheren Rückflüssen aus zwei Investitionsobjekten variiert wird. Aus wissenschaftlicher Sicht liefert der Beitrag wertvolle Erkenntnisse für den jüngeren Forschungszweig der Behavioural Taxation, da er die Transparenz von Steuersystemen und den daraus resultierenden unterschiedlichen Verhaltensweisen der Steuerpflichtigen in Bezug auf ihre Risikoneigung untersucht.[18] Der Beitrag ist ebenfalls von praktischem Interesse. Das in steuerpolitischen Debatten viel und kontrovers diskutierte Thema der Investitionsbesteuerung erfährt mithilfe dieses Forschungsbeitrags eine qualitativ neue Dimension. Um über die Vor- und Nachteile einer Änderung der Besteuerungspraxis Aussagen treffen zu können, ist es unerlässlich, Informationen über das komplexe Zusammenspiel der einzelnen Bestandsteile eines Steuersystems zu gewinnen.

Das zentrale Ergebnis dieser Untersuchung ist, dass Steuerpflichtige bei identischer Gesamtsteuerlast eine systematisch andere Bereitschaft zur Übernahme von Risiko, gemessen durch die Gesamtvarianz des nachgefragten Portfolios, aufweisen, wenn sich das Zusammenspiel zwischen der Besteuerung von Bruttolohn und den Rückflüssen aus der Investitionstätigkeit ändert. Es kann zudem gezeigt werden, dass das System der nachgelagerten Besteuerung von Arbeitseinkommen einen Anreiz für Steuerpflichtige bietet, ihre Allokationsstrategie bei der Wahl zwischen zwei unterschiedlich risikobehafteten Investitionsobjekten zu ändern und ein Portfolio mit größerem Risiko zu wählen.

[18] Erste empirische Hinweise auf die Diskrepanz zwischen unterstellter und tatsächlicher Wahrnehmung von Grenz- und Durchschnittbelastungen und den daraus resultierenden „Irrationalitäten“ im ökonomischen Verhalten werden u. a. von *Enrick* (1963), *Enrick* (1964), *Fujii und Hawley* (1988) und *Gensemer et. al.* (1965) und *Lewis* (1978) belegt und diskutiert.

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Zusammenfassung

Die vorliegende Arbeit setzt sich aus vier Einzelbeiträgen zusammen. Der gemeinsame Forschungsschwerpunkt ist in der Untersuchung von Wahrnehmung und Wirkung der Ertragsbesteuerung und dem daraus resultierenden einkommensteuerlichen Deklarationsverhalten vereint.

Das einführende Exposé nimmt eine Einordnung der Einzelbeiträge in den aktuellen Stand der betriebswirtschaftlichen Steuerforschung vor, indem diese hinsichtlich Thematik, Methodik und Ergebnis kurz beschrieben werden. Im Anschluss daran folgen die vier Einzelbeiträge.

Der erste Beitrag untersucht die Verhaltensreaktion der Steuerpflichtigen auf eine Einkommensteuerreform. Die Reaktion wird auf Basis der Daten des German Taxpayer Panels gemessen und analysiert. Die Ergebnisse zeigen, dass die Einkommensteuerreform zu kurzfristigen elastischen Reaktionen bei den Steuerpflichtigen führt und als Steuerplanung interpretiert werden kann. Langfristig lassen sich nur moderate Verhaltensanpassungen beobachten, welche nicht ausreichen, um von einem aufkommensneutralen Charakter der Reform zu sprechen.

Der zweite Beitrag zeigt, in welchem Maß die fiskalische Anreize gem. § 10 b EStG dazu beitragen, das in der Steuererklärung beobachtbare Spendenverhalten von Steuerpflichtigen zu erklären und zu beeinflussen. Das Ergebnis zeigt, dass unter Einbeziehung von Spenden-Crowding-Out-Effekten die derzeitige steuerliche Abzugsfähigkeit aus fiskalpolitischer Sicht gerechtfertigt werden kann.

Im dritten Beitrag werden die Determinanten der Nachfrage nach Steuerberatungsleistungen analysiert. Da Beratungskosten sowohl als Betriebsausgaben als auch als Werbungskosten deklariert werden konnten, beschränken wir uns Aussagen über Steuerpflichtige, die ausschließlich nichtunternehmerische Einkünfte besitzen. Es zeigen sich positive Effekte von Verlusten und ihrer Verrechnung sowie von ausländischen Einkünften. Korreliert sind ebenfalls steuerliche Abzüge wie z.B. Sonderausgaben und die Nachfrage nach Beratungsleistungen.

Der vierte Beitrag basiert auf einem wirtschaftswissenschaftlichen Experiment. Unter Setzung tatsächlicher monetärer Anreize wird untersucht, welche Auswirkungen das Zusammenspiel zweier Besteuerungsdimensionen auf die Bereitschaft zur Risikoübernahme besitzt: die Arbeitseinkommensbesteuerung und die Investitionsbesteuerung. Das Ergebnis dieses Beitrags zeigt, dass das riskante Investitionsverhalten eines Steuerpflichtigen maßgeblich

durch die Variation der beiden Besteuerungskomponenten bestimmt werden kann. Dies gilt auch dann, wenn sich lediglich die Darstellung der Besteuerung nicht aber die Gesamtsteuerlast eines Steuersystems ändert.

Der Erkenntnisgewinn der vorliegenden Dissertationsschrift ist in den politisch stark umstrittenen und akademisch viel beachteten Bereich des einkommensteuerlichen Deklarationsverhaltens natürlicher Personen einzuordnen. Die Analyse der Einkommensteuerreformen der Jahre 2004 und 2005 zeigen eine elastische kurzfristige Verhaltensanpassung der Steuerpflichtigen als Reaktion auf Einkommensteuertarifsenkungen. Diese impliziert, dass das einkommensteuerliche Deklarationsverhalten maßgeblich durch die Setzung fiskalischer Anreize durch den steuerpolitischer Planer (zumindest) in der kurzen Frist beeinflusst werden kann. Persistente Verhaltensreaktion können hingegen nur beschränkt beobachtet werden. Der Disaggregation des Deklarationsverhaltens in verschiedene Komponenten wird durch die Analyse der einkommensteuerlich relevanten Spendenbeträge als separat betrachtetes Element der Bemessungsgrundlagenermittlung Rechnung getragen. Die Untersuchung zeigt, dass das Spendenverhalten preiselastisch auf fiskalische Anreize reagiert und maßgeblich durch den individuellen Grenzsteuersatz eines Steuerpflichtigen determiniert wird. Die Nachfrage nach Steuerberatungsleistungen stellt einen vor-, gleich-, oder nachgeschalteten Prozess im Deklarationsverhalten dar und kann als wesentliche mitbegründende Komponente dessen angesehen werden. Insbesondere der konstitutive Charakter von Steuerberatungsleistungen prägt die steuerliche Biografie eines Steuerpflichtigen. Ökonomische (und besteuerungsrelevante) Entscheidungen eines Zensiten können sowohl ursächlich für die Nachfrage nach Steuerberatungsleistungen als auch deren Resultat sein. Je vielfältiger die Besteuerungsmerkmale (wie z.B. Spendenbeträge als Sonderausgaben) eines Steuerpflichtigen sind, desto wahrscheinlicher und desto höher ist seine Nachfrage nach Steuerberatungsleistungen. Die regelmäßig in Anspruch genommene einkommensteuerliche Expertise bewirkt wiederum im Gegenzug ein gesteigertes Gewahrsein von entstehenden und/oder entstandenen steuerplanerischer Potenziale in der kurzen Frist. Die experimentell erhobenen Daten belegen zudem, dass die unterschiedliche Darstellung identischer einkommensteuerlicher Belastungen zu signifikanten Abweichungen im Entscheidungsverhalten von Zensiten führen kann. Die systemische Transparenz in der Einkommensbesteuerung prädeterminiert das persönliche Verständnis für das eigene Deklarationsverhalten und somit implizit die individuelle Nachfrage nach Steuerberatungsleistungen. Letztere ist aus steuerpolitischer Sicht ein verlässlicher Indikator

für die Beurteilung, welche steuerlichen Anreize als verhaltensmaßgeblich für das Deklarationsverhalten erachtet werden können.

Summary

This cumulative doctoral dissertation consists of four empirical essays with income taxation as its common element. The focus is the analysis of selected income tax privileges and their effects on taxpayer behaviour.

The first article provides new empirical insights on the elasticity of taxable income to the net-of-tax rate. Using longitudinal income tax return data, the paper studies the effects of the German income tax reforms of 2004 and 2005 on individual (taxable) income growth, resulting from lower marginal tax rates. Disentangling short-term and long-term responses, the estimates indicate different dimensions of behavioral changes. The preferred specification yields high short-term and only moderate long-term elasticities, implying that the income tax reforms are recognized by taxpayers as an opportunity to saves income taxes without changing their individual reporting behavior persistently.

The second paper analyses the tax privilege for charitable giving. From a sample of German income tax returns, the elasticity of charitable giving relative to tax incentives is derived to evaluate its fiscal effectiveness. Controlling for income and government spending effects, we conclude that the current deduction of private charitable giving for tax purposes is eligible to offset foregone tax revenues. From a fiscal point of view, the German system of tax deductibility should be rather maintained than abolished, when crowding-out effects are taken into account.

The third article contributes to the empirical tax research literature by identifying tax and non-tax characteristics which determine the individual demand for tax preparation services. Restricting the analysis to taxpayers with non-business income, empirical results find a strong and positive effect of tax losses, tax loss offsets and foreign source income. The findings also reveal that capital income and various tax deductions are important factors for the individual need of tax preparation services. Using tax preparation services can be regarded as a tool to become aware and manage income tax complexity.

The fourth paper contains a controlled real-effort laboratory experiment to analyze the combined and isolated effects of labor and capital income taxation on individual risk taking. Holding constant the overall strain on the taxpayer´s earnings, the results indicate that taxpayers exhibit a higher propensity to take more risk, when tax incentives are shifted away from the capital income earnings towards labour earnings.

Lebenslauf

Der Lebenslauf ist in der Online-Version aus Gründen des Datenschutzes nicht enthalten.

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Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany, FACTS Discussion Paper, School of Business & Economics, FU Berlin, Nr. 2012/22, (mit C. Werdt).

The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour - An experimental analysis, FACTS Discussion Paper, School of Business & Economics, FU Berlin, Nr. 2013/1.

Anmerkung: Die grau hinterlegten Fachbeiträge sind Teil dieser Dissertation.

Überblick über die Einzelbeiträge

- The demand for tax preparation services: Empirical evidence from Germany, in: Die Betriebswirtschaft (2012) 72 (1), S. 525-554, (mit S. Eichfelder, F. Hechtner, C. Sielaff).

- Charitable Giving in the German Welfare State: Fiscal Incentives and Crowding Out, in: Public Choice 2013, 154 (1), S. 39 - 58, (mit T. Bönke und C. Sielaff).

- Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany, (mit C. Werdt), FACTS Discussion Paper, School of Business & Economics, FU Berlin, Nr. 2012/22.

- The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour - An experimental analysis, FACTS Discussion Paper, School of Business & Economics, FU Berlin, Nr. 2013/1.

Estimating Dynamic Income Responses to Tax Changes: Evidence from Germany

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Abstract

This paper provides new empirical insights on the elasticity of taxable income to the net-of-tax rate. Using a panel of German income tax return data, we followed taxpayers from 2001 to 2006 to analyze the effects of the German tax reforms of 2004 and 2005. Implementing a dynamic model as proposed by Holmlund and Söderström (2011), we are able to disentangle short-term and long-term responsiveness. These estimates allow us to distinguish between different dimensions of behavioral changes: short-term income reactions in contrast to 'real' changes in (reporting) behavior. We compare our results with recent German estimates from the established approach by Gruber and Saez (2002) applied by Gottfried and Witzcak (2009). Following Chetty`s (2009) theoretical considerations, we use multiple (tax code related) income concepts and alternative sample choices. We provide several robustness and validity analyses of the most common income concept, i.e. taxable income excluding capital. Our preferred specification yields (very) high short-term yet small long-term elasticites. The latter range from 0 to 0.16, implying none or only modest persistent behavioral changes to marginal tax rate cuts.

Keywords: Long-term income responses, taxable income elasticity, dynamic panel data estimation, income tax return data

JEL codes: C26, H21, H53

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1 Introduction

For the evaluation of tax reforms the elasticity of taxable income to net-of-tax rate (ETI) has emerged as the central fiscal policy parameter (Feldstein 1995, 1999) over the last years. It is defined as the percentage change in taxable income that results from a percentage change in the net-of-tax rate (NTR). ETI has been established to capture more dimensions of behavioral responses to income tax reforms than labor supply elasticity estimates.

Since Feldsteins' (1995) seminal contribution, a massive body of ETI literature has emerged. A very comprehensive overview of empirical results and econometric methodology is provided by Saez et al. (2012). The review can be further considered a guideline for proper research on ETI. The authors survey the most common estimation strategies; discuss possible drawbacks and identification issues. They highlight that dynamic panel estimation strategy is a promising complement and improvement of estimation methodology for future research.

The majority of previous empirical results on ETI have focused on immediate income responses to tax changes, based on a prominent specification by Gruber and Saez (2002). Most US studies suggest an ETI within a range of 0.3 and 0.6.[2] German findings tend towards a similar size.

Gottfried and Witczak (2009) were first to adopt Gruber and Saez' approach using German income tax return data. Their preferred specification reports an elasticity of taxable income of 0.6. Empirical findings for Germany and Europe are still scarce.[3] Relying on the dynamic approach by Holmlund and Söderström (2011), we do not only contribute to the literature by delivering further ETI estimates: (1) We distinguish between immediate and persistent behavioral changes, resulting from the tax reforms. (2) By applying alternative income concepts and different sample choices, we provide a wide range of ETI estimates and test their sensitivity. We analyze the German tax reforms of 2004 and 2005 and use the most recent and very rich German income tax return data (assessment years 2001 to 2006). This major reform is characterized by both tax base broadening and a reduction of all marginal tax rates. Our approach differs in several aspects from the prevalent approach in the literature: (1) Our data allow us to observe not only cuts in tax rates for some taxable incomes, but for the

[2] Auten and Carroll (1999) & Gruber and Saez (2002) provide important estimates for US tax reforms.

[3] Two other studies exist for the German case. Gottfried and Schellhorn (2004) analyse the 1990 change in personal income tax schedule for taxpayers in Baden-Wuertemberg. Their results suggest an average ETI of 0.4. Controlling for business income and high-income households, they find values up to 1.0. Müller and Schmidt (2012) contribute in German language by their analysis of the German income tax reforms of 2004 and 2005. Relying on the common approach by Gruber and Saez (2002), they find small elasticities, ranging from 0.2 to 0.4.

whole distribution of taxable income. (2) Contrary to other tax schedules, the German Income Tax Code assigns varying marginal tax rates between and within brackets as taxable income rises. (3) Behavioral responses to marginal tax rate changes are likely to be not only immediate but rather gradual; we pioneer with providing short- and long-term estimates of taxable income elasticity for Germany. Providing separate estimates for single and married taxpayers, we also control for immense differences in tax planning potential between married and single taxpayers. Moreover, married taxpayers benefit from a splitting boon, which heavily discriminates between these two groups. Single taxpayers differ in various socio economic aspects from married taxpayers, implying different utility functions. In the regressions we use only taxpayers which do not change from single filing to joint taxation. This causes a possible selection bias for sample with the single taxpayers. This is a fairly long time given that our sample comprises mainly of middle aged income earners.

These differences are likely to be non-linear and hard to control for properly in (linear) regressions. Regression results approve the empirical need for the separation. Results are drawn from a balanced panel of income data, using years 2001 to 2005. We do not only find substantial differences in responses between single and married taxpayers but also between income concepts, pointing to a cautious and thorough evaluation of the German income tax reform. Controlling for the influence of taxpayers at the top end of the income distribution, we find that estimates are (very) sensitive to sample selection and observation periods. Our empirical findings indicate that long-term behavioral changes are considerably smaller than short-term reactions, while single taxpayers tend to be less short-term responsive than married taxpayers. Relying on our preferred specification, the latter show a significant and pretty robust short-term reaction, amounting to 1.07 with a considerably small long-term reaction of 0.14. For single taxpayers, the short-term elasticity of 0.62 is much lower and similar to the long-term responsiveness, amounting to 0.49. Using three alternative tax-code related income definitions, our robustness analysis enables us to interpret special tax responses from different income sources. While income from capital does not drive the elasticity estimates, income from rent & lease exhibits significant influence on long-term estimates. The general pattern shows a strong short-term reaction to the German income tax reform, exceeding unity for married taxpayers and 0.6 for single taxpayers. Long-term responsiveness are harder to identify precisely, ranging from -0.40 to 0.49.

Following Chetty's (2009) objections on the validity of ETI for welfare analysis, we also estimate elastiticities based on an alternative income concept, relying mostly to the ideas of Bach et al. (2009). These findings suggest an unintuitive and strong(er) short-term and long-

term behavioral response for single taxpayers, accentuating the sensitivity of estimates, when "more realistic" income measure is derived.

The paper proceeds as follows. Section 2 gives a short overview of the German tax system and describes the German tax reforms. Section 3 presents the data and its preparation. The empirical strategy is discussed in Section 4. Section 5 presents our empirical findings and compares with recent German results. Section 6 concludes.

2 The German Income Tax System and Recent Reforms

The German income tax schedule is directly progressive, marginal tax liability increase with taxable income. Income above the basic tax allowance is divided into several brackets. Contrary to most other progressive tax systems, the German tax schedule is not a step system. The German tax schedule substantially discriminates between single and married taxpayers.[4] Married taxpayers can opt for the splitting tax schedule to decrease their joint taxation and marginal tax rates.[5]

The change of government in Germany in 1998 was associated with intensive discussions about tax reforms. The new red-green government agreed upon several reforms of income and corporate taxation starting in 1999. It has been the biggest bundle of income tax reforms in Germany's history since World War II. Prior to our observation period, two major parts of that reform bundle were implemented. One was a reform affecting personal income taxation indirectly.[6] The other part of the reform was directly related to personal income taxation and aimed at reducing all marginal tax rates of the German tax schedule. Between 1999 and 2001 the bottom marginal tax rate was cut from 25.9% to 19.9%, whereas the top marginal tax rate was reduced by 4.5 percentage points from 53% to 48.5%. Marginal tax rates in-between were reduced accordingly. The most prominent tax reform was passed in 2000 and consisted of a further gradual reduction of personal income tax schedule, accompanied by modest tax

[4] Steiner and Wrohlich (2007) provide their theoretical as wells as empirical evidence how different forms tax splitting affects economic dimension, e.g. household welfare and work incentives.

[5] Marginal tax rates for married couples are determined as if one single taxpayer would earn the average taxpayers income. Accordingly, the tax burden is calculated as twice as much the single taxpayer with the average income would have to pay. Given the progressive schedule, married couples with uneven distributed incomes can reduce their overall tax burden, thus marginal tax rate. O´Donoghue and Sutherland (1999) discuss how joint taxation affects the incentives of the spouse of the main earner to earn income. They point out that "the earnings of one spouse [the secondary earner] may be taxed at a higher marginal rate than if they were single, or if they were the main earner. "

[6] It was a significant paradigmatic change in corporate taxation, taking place between 2000 and 2001. Its main attribute was the reduction of the corporate tax rate from 45% to 25% combined with simultaneous corporate tax base broadening. The reform of corporate taxation also included several adjustments regarding the income taxation.

base broadening. It was implemented in our survey period from 2001 to 2005 and was by no means designed to be income tax revenue neutral but to foster economic growth.[7] The reform combines several steps which lower the income tax schedule in 2001, 2004 and 2005. Besides the reduction of all marginal tax rates, the basic tax allowance was slightly increased from 7,206 EUR in 2001 to 7,664 EUR in 2005. Figure 1 depicts the NTR for single assessed tax units in 2001, 2004 and 2005 depending on taxable income. Since the tax base broadening had only little effect on the actual definition of taxable income, we are able to construct a time consistent taxable income. Estimation results are based on marginal tax rates from this income definition.[8]

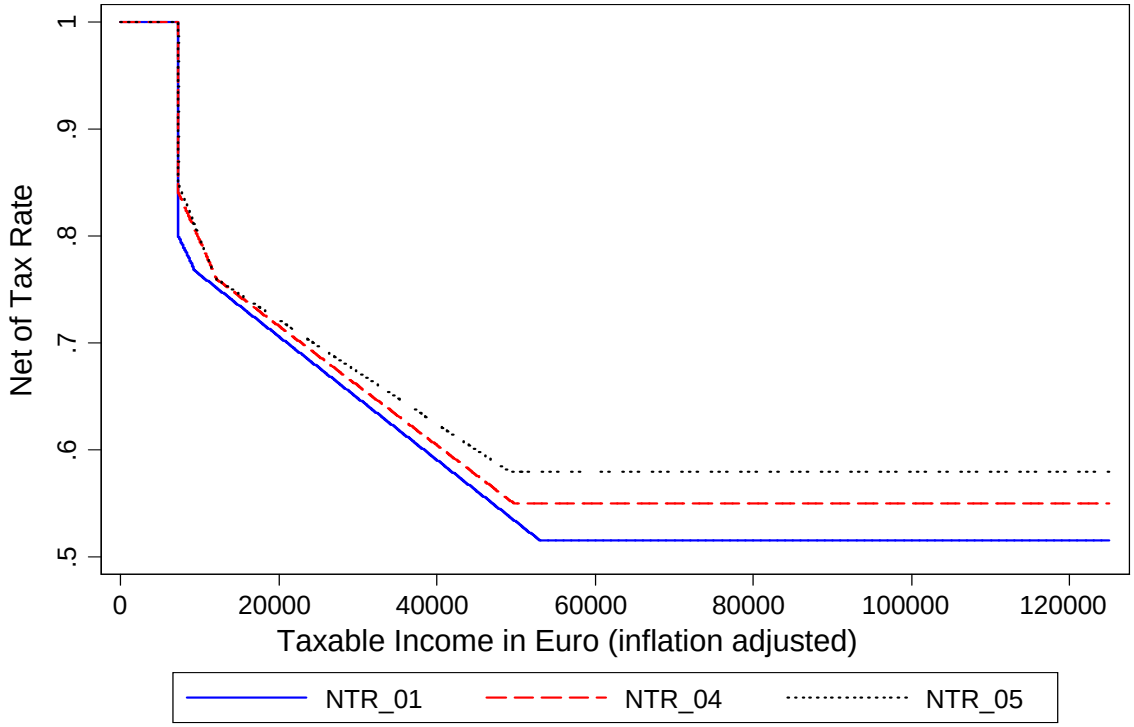

Fig 1. Net of Tax Rate for a single assessed tax unit in prices of 2005

[7] Parallel to the income tax reform, the German government implemented another comprehensive set of labor markets reforms so called Hartz Reforms during our observation period between 2003 and 2005. These reforms fundamentally changed institutional and legal framework of the labor market and the benefit system. Merging unemployment assistance and social welfare transfers, restricting the rights of unemployed were cornerstones of the Hartz Reforms. Since the reduction of employment protection in some labor market segments is only a minor part of the Hartz Reforms, we do not expect significant interferences with the analysis and evaluation of the income tax reform.

[8] We take the definition of taxable income in 2001 as our benchmark. We are able to control for the most important tax base broading measures: annual child allowances were modified from 2556 € to 2904 € per child, most loss offsetting rules were cancelled in 2004, allowable expenses for non-itemizing employees were reduced from 1044 € to 920 €, allowances for single parents were lowered from 2871 € to 1308 €, exemptions for capital gains of 1550 € were cut to 1370 €. Gruber and Saez (2002) point out that this procedure might underestimate the responsiveness of taxable income.

3 Data and data processing

Relevant information generated in the process of taxation is documented in the income tax return: information on the family situation, declaration of income from different sources, granted deductions and exemptions, calculation of taxable income, and personal income tax payment. The German Federal Statistical Office collects the official income tax returns electronically as Income Tax Statistics, providing the basis for a balanced panel, the German Taxpayer Panel. Individual taxpayer's IDs are used to link annual cross section income tax returns over time to create the panel. However, this procedure might be problematic. In cases of marriage, divorce or moving to another federal state, individual tax ID will be given up, created new or changed. Additionally, German wage earners are not forced to file a tax return unless they have other sources of income. Moreover, the incentive for wage earners of filing a tax return depends on the expectation of a possible tax refund. The German Taxpayer Panel does not include tax returns, which are only available for a subset of years and not consistently linkable. It contains income tax returns of approximately 19 million observations out of possible 31 million taxpayers included in the Income Tax Statistics. Several socio-economic characteristics of taxpayers such as age, number of children, church membership and marital status are observable. On basis of four stratifications criteria, i.e. federal state, assessment type, main type of income and total income, a 5% sample is drawn and made available for scientific purposes. The stratification procedure aims to optimize the sample with regard to standard errors of total income over time. Observation weights are generated accordingly. For our analysis, we consider taxpayers who are fully liable to income tax, pay taxes and whose marital status does not change between 2001 and 2005. We also exclude taxpayers whose (time consistent) respective (taxable) income concept does not exceed the basic free allowance in 2001 and 2002.[9]

By pooling the years 2005, 2003 and 2001 as well as 2004, 2003 and 2002, we impose two different lag structures.[10] To keep as many observations and information as possible, we choose a loose and unrestrictive selection approach. Referring to the full samples and our preferred specification, our selection approach leaves us 897,826 observations, which is divided into two subsamples for married (631,370 cases) and single taxpayers (266,456 cases).[11]

[9] 2001 and 2002 serve as pre-base years in our estimation procedure.

[10] The estimation strategy is based on calculating growth rates between three subsequent years, for details see section 4.

[11] Due to selection we exclude approximately 48% of the taxpayers. Most of them are excluded because they either have non positive harmonized income (22%) , their statutory taxable income is below the free allowance (14%) or their marital status changes (10%). The remaining 6 % are due to the change into retirement, taxpayers

We try to capture estimation results on the largest sample possible. Accounting for the influence of richer taxpayers on our estimates, we apply different cutoff rules at the upper end of the income distribution.[12]

By including income source specific covariates and socio-demographic covariates, we control for possible sources of heterogeneity among taxpayers. Table A1 in the Appendix describes the socio-demographic and income source specific covariates in greater detail.

4 Econometric Specification

Following Gruber and Saez (2002), the uncompensated ETI equals

$$\beta = \frac{1-\tau}{z} \cdot \frac{\partial z}{\partial (1-\tau)},^{13} \tag{1}$$

where z denotes the income before taxes and $(1-\tau)$ the net-of-tax rate. ETI is estimated by using a log-log specification. The most common approach is introduced by Auten and Carroll (1999) and their extension by Gruber and Saez (2002). The standard income growth model can be expressed as:

$$\Delta z_t = \beta_1 \Delta n_t + \rho f(z_{t-1}) + \gamma W_{t-1} + \Delta \varepsilon_t \tag{2}$$

with Δz_t as the growth rate of income between post reform year t and pre reform year $t-1$ and Δn_t as the net-of-tax growth rate. Socio-demographic characteristics are contained in W_{t-1} and contain time consistent and invariate (dummy) variables such as age, gender, main income source etc. The inclusion of $f(z_{t-1})$ controls for mean reversion and is specified as either a logarithm of the lagged income or in higher non-linear form.[14]

[Table 1 about here]

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who are not fully liable to (German) income taxation, or taxpayers with (high) exceptional income from selling her own company.

[12] Lower and upper cutoff rules are based on the definition of the respective income concept.

[13] Although some studies specify possible income effects of a change in tax rates, there is still no consensus on the magnitude of income effects. Gruber and Saez (2002) are the first to address the problem and found only small and mainly insignificant income effects of tax reforms.

[14] Where Auten and Carrol (1999) were first to include such a control with a linear coefficient, Gruber and Saez (2002) extended the approach with a linear spline function.

Table 1 gives an overview of the main variables included in the models (2) and (3). Holmlund and Söderström (2011) are the first to emphasize that the common specification in (2) possibly ignores severe econometric problems. The error term in (2) is a first difference, while z_{t-1} and $\Delta\varepsilon_t$ are likely to be correlated. Moreover, the conventional approach does not allow for the computation of long- and short-term estimates, estimating only some unknown combination of the two. Even when one controls for the lag structure, results depend on the base year and could be biased. Their approach generalizes conventional empirical specifications by explicitly separating possible short- and long term behavioral responses.[15] Following their notation, our first-differenced final dynamic estimation equals:

$$\Delta z_t = \beta_1 \Delta^2 n_t + (\beta_1 + \beta_2)\Delta n_{t-1} + \rho \Delta z_{t-1} + \gamma W_{t-2} + \Delta \varepsilon_t \qquad (3).$$

Contrary to the Gruber and Saez (2002) model, consistent estimates of (3) are challenged by more than one endogenous variable in 2SLS: $\Delta^2 n_t$, Δn_{t-1} and Δz_{t-1} .[16] We instrument them by constructing counterfactual growth rates for the first steps.[17] We use income type specific and aggregate growth rates to derive counterfactual incomes based on the years 2001 and 2002. Relying on sufficient high partial R^2 values, our instruments for the NTR and lagged income growth are strong in the first stage (See Table A4 in the Appendix for further details). Following Holmlund and Söderström`s notation, we interpret the β_1 coefficient as the short-term elasticity, while the compounded coefficients $\frac{\beta_1+\beta_2}{1-\rho}$ determine the long-term responsiveness.

5 Results

Our estimations are computed by using the income growth between 2003 and 2004 as well as 2003 and 2005. Before we depict regression results, we highlight descriptive statistics for income growth in Table 2. Taxpayers are sorted according to their pre-base year income and are split into different income ranges. Table 2 confirms that standard deviations increase while lagged income decreases (heavily) with increasing income. It indicates high negative

[15] The complete derivation of the model is given in the Appendix.
[16] Possible pitfalls with 2SLS and a discussion of the weak instrument problem can be found in Staiger and Stock (1997).
[17] We follow the common approach in the literature by constructing counterfactual net-of-tax rates from counterfactual incomes. Counterfactual incomes are computed by inflated pre reform year income with income-source specific or aggregate growth rates. For the lagged income growth, we derive a counterfactual lagged income growth as instrument.

growth rates among richest taxpayers, even over the whole observation period. In particular, the log of lagged taxable income for married (single) taxpayers with a pre-base year income above 1,000,000 (500,000) EUR reveals unusual growth rates in both lag structures. From 2000 to 2001 the first significant reform step on the marginal tax rates was implemented. Since our data start with assessment year 2001, we are not able to control for the potential bias, resulting from this reform component. However, this might cause a substantial influence on our regression results, especially on the ones of the top income earners.[18]

[Table 2 about here]

We try to capture estimation results on the largest sample possible. Accounting for the influence of richer taxpayers on our estimates, we apply different cutoff rules at the upper end of the income distribution.[19] To account for the top income group's potential influence we perform additional robustness checks without the top income earners. For married taxpayers we sequentially exclude observations exceeding a taxable income higher than 1,000,000 EUR (800,000 EUR) in 2001 or 2002, cutting nearly 1.1% (4.6%) of the full sample. For single taxpayers we perform robustness checks excluding incomes higher than 500,000 EUR (400,000 EUR) cutting about 2.1% (2.6%) of the single taxpayers observations.[20]

By including income source specific covariates and socio-demographic covariates, we control for possible sources of heterogeneity among taxpayers. Table A1 in the Appendix describes the socio-demographic and income source specific covariates in greater detail.

Slemrod (1992, 1994 and 1995) derives a hierarchy for behavioral reactions, indicating that 'real' behavior is least responsive and closest to long-term estimates.[21] For the sake of lucidity, we depict shortened regression output, including the short-term, the long-term elasticity and the coefficients necessary to compute the long-term elasticity.[22] We interpret immediate (short-term) responses rather as short-term tax planning than 'real' behavioral reactions; while long-term responses are interpret as 'real' behavioral changes. Our understanding is the short-term response aims to save income taxes, whereas 'real' behavioral changes indicate real individual income growth induced by tax reforms.

[18] Our panel allows us to identify "the richest taxpayers" on basis of few years only. Since the pre-base years are the only years without potential endogeneity, we use them for our cut-off rules.
[19] Lower and upper cutoff rules are based on the definition of the respective income concept.
[20] Since we estimate the income growth 2003 to 2004 and 2003 to 2005, our pre-base years are 2002 and 2001 respectively.
[21] According to Slemrod´s considerations, short-term reactions are likely to be driven by a change in reporting behavior and/or the timing of transactions. The distinction between long-term and short-term elasticities is of particular interest to compute the impact of habit persistence (see Johnson and Pencavel, 1984). Additionally, taxpayers might not be perfectly informed and need some time to adjust.
[22] Coefficients of socio-demographic controls are given in the Appendix (Tables A7-A10).

Regressions are performed in three dimensions. First, we compute different results for samples, applying the aforementioned cutoff rules. Second we investigate elasticities for four different (tax code related) income aggregates. Third, we split regressions for married and single taxpayers. Main results are presented in section 5.1 (Table 3) and rely on the two most common income concepts. These results are compared with other recent German findings from Gottfried and Witczak (2009). Finally, a sensitivity analysis with two alternative income concepts is given in section 5.2 (Table 4).

5.1 Results for Taxable Income Concepts

Table 3 depicts regression results in four blocks. The upper two blocks present estimates based on the taxable income excluding income from capital. Results for married taxpayers are shown on the left and for single taxpayers on the right side. The lower two blocks are sorted the same way, but based on the statutory taxable income.

Presented results summarize coefficients of interest, namely the short-term elasticity $\hat{\beta}_1$ and necessary coefficients to derive the long-term elasticity $(\hat{\beta}_1 + \hat{\beta}_2)$ and $\hat{\rho}$.

Short-term elasticities for married taxpayers are fairly high, significant and robust to cutoff rules exceeding unity with mean 1.14. There is only little variation between the different sample sizes. Moreover, there are no considerable differences for the short-term estimates, when income also includes capital. Long-term elasticities for married taxpayers are (much) smaller and significantly sensitive to income cutoffs at the top. The long-term elasticity is negative for both full samples: -0.41 and -0.18. The lower the top income cutoff is, the stronger the long-term responsiveness. This is observable for both groups of taxpayers. When the cutoff applies for incomes exceeding 800,000 EUR, the long-term elasticity becomes significantly positive, ranging between 0.14 and 0.16. Again, differences between the income concepts are very small.

For single taxpayers short-term reactions are dependent of the sample selection and vary between 0.62 and 0.97. The short-term responsiveness decreases, the lower the cutoff income is. Results are insensitive to the underlying income concepts. For the whole sample long-term elasticties are insignificant, but become statistically significant and increase to approximately 0.50 with cutoff. Overall, the difference between short-term and long-elasticities is more pronounced for married taxpayers than for single taxpayers, while single taxpayer show stronger long-term reactions.

[Table 3 about here]

Feldstein (1999) derived a formula to calculate the excess burden of income taxation by ETI. In his setting, the deadweight loss is directly proportional to the ETI with respect to the net-of -tax share.[23] Assuming a long-term elasticity of 0.5, the deadweight loss is approximately cut in half, implying only a modest or at least a substantially lower deadweight loss by income taxation than found in previous studies.

We are able to derive several important implications from our findings:

(1) Single and married taxpayers react differently to the income tax reform, supporting separate estimations. This is true for short-term as well as long-term elasticities. The obvious fact is that most jointly assessed taxpayers generate more (taxable) income, resulting in higher economic resources and more allocation flexibility with regard to working time in the long-run. They also benefit from the opportunity of intrapersonal transfers affecting short-term behaviour.

(2) Our results emphasize the useful separation of short-and long-term elasticities. Moreover it supports the hypothesis that short-term responsiveness is heavily influenced by tax planning motives and cannot be regarded as real behavioral changes. This seems to be especially pronounced for married taxpayers.

(3) Long-term behavioral responses are substantially smaller than short-term responses. Estimates for married taxpayers are much smaller than for single taxpayers. In case of the full sample for married taxpayers, we even find negative long-term elasticities. This seems to be mainly driven by high income earners as restricted samples provide another picture, indicating modest positive behavioral responses. Since high income earners should have high tax planning possibilities, these taxpayers seem to pull results below zero.[24]

(4) Short-term estimates are robust to sample selection, whereas long-term elasticities are very sensitive to the inclusion of richer taxpayers. Gottfried and Witczak (2009) were first to present empirical estimates of the ETI for Germany, applying the approach by Gruber and Saez (2002). Their preferred specification pools single and married taxpayers, controlling with a dummy variable for joint filing. They report an average ETI of 0.6, which is in range of our short-term estimates for single taxpayers but rather in between the short-and long-term elasticities for married. Gottfried and Witczak`s (2009) perform only estimations based on the statutory taxable income, but do not deliver results for the commonly used statutory taxable income without income from capital. They also include some interaction term with the elasticity coefficient in their favored specification. We are not sure how to interpret results based on the described specification. Thus, we believe that our estimation strategy is helpful

[23] See Feldstein (1999), p. 677.

[24] This result can be also found in some previous studies, i.e. Goolsbee (2000), Heim (2009), Giertz (2010).

to improve the evaluation of the German income tax reform by disentangling one-time from more persistent increases in taxable income. The application of the dynamic approach allows us to control for potential announcement effects. Since the whole reform was well known to taxpayers in advance, our estimation method is eligible to identify more dimensions (immediate and gradual) of behavioral responses for different types of taxpayers.[25]

5.2 Results for Alternative Income Concepts

For robustness of our estimates and a wider understanding of ETI as a measure for welfare analysis, we vary the underlying income concept in two more ways. First, we compute an alternative taxable income excluding both income from capital and from rent and lease. One can argue that income from rent and lease is also a rather capital intense component and thus very similar to income from capital itself. Moreover, income from capital intense sources possesses more tax planning potential than labor intense sources. Therefore, these incomes are likely to react differently to cuts in marginal tax rates.

Furthermore, we follow Chetty`s (2009) theoretical considerations by estimating behavioural responses to the tax reform with other than purely tax code related income concepts. The construction of a 'real' economic income from income tax return data is challenging but still promising.[26] Similarly to the approach from Bach et al. (2009), we derive an aggregate gross income, the AGI, from information contained in the income tax returns. [27] It differs in a whole range of aspects from the taxable income. The construction comprises the sum of all gross incomes, tax reliefs, allowances, specific depreciations, as well as several tax free earnings. This income concept is designed to be a better proxy for the actual consumption possibilities than the (tax code based) income aggregates provided in the data. It allows a more reasonable interpretation of 'real' behavioural responses to tax reforms. Table 4 depicts estimates for these alternative income concepts. First we depict results from the taxable income excluding income from capital and rent & lease. Comparing the results from this income definition with estimates from the standard concepts allows investigating the influence of exclusion of the two most capital intense income sources on coefficient estimates. For further robustness check we exclude the same taxpayers, when applying the same cut off rules as described above.

[25] Due to the flooding of River Oder in 2002, one of the reform steps in 2003 was postponed for one year and added to the (planned) reform step in 2004, potentially upwardly biasing elasticities estimates.
[26] See for example Gruber and Saez (2002) and Giertz (2004, 2010).
[27] Since Bach et al. (2009) control for various negative incomes and classify them as pure tax savings; we do not incorporate all of their adjustments. Further information on the adjusted gross income construction is given in Table A7 in the Appendix.

Results for the taxable income excluding income from capital and rent & lease differ partially from our preferred specification, i.e. statutory taxable income, depending on the sample size and coefficient estimate. Results for the full samples for married and singles are quite similar in magnitude to the results from the taxable income excluding income from capital. Even results for the short-term elasticities are hardly distinguishable over all samples. However, long-term elasticities are significantly smaller for all of the restricted samples. For married taxpayers long-term elasticities do neither show significant estimates for the two restricted samples. The long-term elasticities for single taxpayers are significantly different from zero. They vary around 0.3 but are also significantly smaller than results from taxable income excluding capital. This is especially interesting because it suggests that income growth, in the long-term, seems to depend highly on the income from rent & lease. Given that this type of income is a common tax planning tool to reduce tax burden, long-term results appear to be driven by this factor. Incomes from rent & lease on average is negative, thus it looks like that negative incomes decline according to the tax reform.

While the estimates for different taxable income concepts show high sensitivity to the inclusion of the richest taxpayers, it is remarkable that coefficients for the AGI are less affected by sample selection. Short-term elasticities are always above unity with pretty similar patterns for married and single taxpayers. Estimates range from 1.27 to 1.23 and 1.21 to 1.34 respectively. Contrary to more tax-code related income measures, there is no clear distinction between immediate responses between these two groups of taxpayers.

With regard to the long-term elasticities, it is remarkable that all estimates are positive and significantly different from zero while still having a substantial difference to the short-term estimates. Comparing results to our preferred specification (in the full sample, Table 3), immediate responses of the married taxpayers are economically not distinguishable: 1.27 versus 1.26, whereas the short-term reactions are severely different: -0.41 versus 0.13. For single taxpayers the long-term elasticity exceeds our preferred long-term elasticity: 0.47 versus 1.01.

It is surprising that the estimates for the AGI concept imply rather higher ‘real’ responses than for the statutory taxable income concept. The AGI tries to comprise income components that are economically more relevant than the taxable income only. While a broad range of applied economic research relies on AGI as an important variable, we are only able to construct our AGI on tax code related data. Since tax code data provide rather a small range of non-tax code related information, our AGI might lack central income components. Moreover, income tax return data just provide vague and implicit details on important aspects such as taxpayers´ wealth, tax-sheltering activities and the consumption of tax-favored goods. We believe that

these missing pieces are decisive and especially affect the growth rate of our AGI, explaining the discrepancies between our empirical findings and expected results from theory. From our sensitivity analysis with the AGI concept we are able to derive two findings: (1) Elasticity estimates are (slightly) bigger than estimates which are based on tax-code related income. We raise doubt if these results reflect real behavioral changes. However, given that AGI comprises more information, these results are nevertheless important for a careful distinction between more economic dimensions and just tax code related. (2) We find that the magnitude of our estimates is more robust, when we control for the influence of taxpayers at the upper end of the income distribution. Results are less sensitive to sample selection, indicating that tax planning potential is not equally distributed among taxpayers but affected by the size of their overall taxable income and its composition.

6 Conclusion

There is still no consensus in literature on the size and influence of marginal tax rate changes on reported taxable income. While ETI holds promises to capture more dimensions of behavioral responses to (income) taxation, its importance for welfare analysis is doubtful. Nevertheless it retains "… the promise of more accurately summarizing the marginal efficiency cost of taxation than a narrower measure of taxpayer response such as the labor supply elasticity." (See Saez et. al, 2012). Moreover, Slemrod (1998) emphasizes "[ETI] ... is more important than all others, because it summarizes all of what needs to be known for many of the central normative questions of taxation." ETI is still the central parameter for assessment of tax reforms. Disentangling long-term from short-term elasticities also promises to deliver results that are more related to real behavioral responses, serving as an adequate potential proxy for calculation of deadweight losses of progressive taxation.

Our approach is a promising tool to evaluate income tax reforms more profoundly. We contribute to the existing empirical literature on ETI by providing short- and long-term elasticity estimates for Germany. Moreover we derive results from four different income concepts, confirming the common view that only some income sources features considerable taxable income planning potential.

Our findings support the view that there are at least two behavioural effects resulting from an income tax reform: (1) Short-term changes in reporting behaviour. (2) Long-term responsiveness as economic adjustments by taxpayers.

Although the current empirical literature favours the distinction and highlights its importance, the vast majority of previous approaches do not distinguish between long- and short-term reactions. For the German case we pioneer in providing benchmark short-term and long-term

estimates. Results exhibits high sensitivity to the underlying income concepts, cut off rules at the upper end of the income distribution and between married and singles.[28] The short-term elasticity of married taxpayers of taxable income to the net-of-tax rate is fairly high, while short-term estimates for single are significantly lower.

Following Giertz (2010), we can confirm that empirical results depend considerably on the concrete empirical model and possible innocuous control variables.[29] Chetty (2009) highlights alternative explanations for the wide range of estimates found in the literature. Both the income concepts as well as taxpayers ability to plan and shift income complicates interpretation of ETI. Moreover, Chetty provides a detailed critical discussion, and argues that ETI as the only central measure of welfare analysis is at least not unproblematic. He concludes that high elasticities might result from tax planning and tax avoidance. As robustness check, Chetty proposes the use of other income concepts (in combination with taxable income) to calculate real marginal excess burden of taxation.[30] We perform estimations on an alternative income concept and obtain strong(er) results compared to ETI. This finding does not come by surprise since we are using income tax return data, which is only conclusive for some of the income sources. While data quality on income sources like income from employment is very comprehensive, detailed data on other taxable income components is not always available.[31] Thus, we interpret our AGI results with caution but still agree with Chetty.

His vote for theoretical and empirical rigor, i.e. the proper empirical application of theory based multiple alternative income concepts to determine a range of ETI estimates, provides a solid basis for the estimation of short-term and long-term ETI. Future research should also concentrate on the inclusion of sophisticated income control in a dynamic estimation framework to account for divergence within the income distribution and the impact of richer taxpayers. We also believe that there is a substantial need to distinguish between different responses to tax reforms, e.g. increasing real income, changes in reporting behavior, income shifting between spouses, the willingness to itemize and to donate. With more years of

[28] Long-term elasticities are very sensitive to the exclusion of taxpayers with higher taxable incomes. Short-term estimates are similar to the elasticity results from Gottfried and Witczak (2009). Their result is only little smaller than our short-term estimates for married taxpayers. With regard to long-term responses, our findings indicate that persistent behavioral changes are rather modest and imply that marginal tax rate reductions do not significantly increase taxpayers´ (taxable) income. Tax induced permanent income changes appear to be rather small, implying only modest deadweight losses of progressive taxation, raising doubts about tax revenue neutral tax reforms.

[29] Giertz votes for the need of empirical rigor. However, the literature demonstrates the lack of consistency in estimation modeling.

[30] For example, Gruber and Saez (2002) use a wider income concept than taxable income for robustness analysis.

[31] Data for income sources like self-employment or business are limited to profits subject to taxation. Necessary information such as specific consumption-reducing-profit is not available.

observations available, these will be promising steps to identify exogenous economic trends affecting (the components of) ETI.

Table 1. Dependent variable and variables of interest

Variable		Description	Coding/ Construction
Dependent variable	Δz_t	Change in (taxable) income between pre and post reform years	Log of the growth rate of (taxable) income
Main covariate	Δn_t	Changes in counterfactual marginal tax rates between pre and post reform years	Log of growth rate of counterfactual marginal tax rates
Main covariate	Δn_{t-1}	Changes in counterfactual marginal tax rates between pre and post reform years (Not included in (2))	Log of growth rate of counterfactual marginal tax rates
Main covariate	Δz_{t-1}	Changes in (taxable) income between pre reform years (Not included in (2))	Log of the growth rate of (taxable) income
Main covariate	z_{t-1}	Pre reform year income (Not included in (3))	Log of pre reform years (taxable) income
Socio-demographic and income specific covariates	W_{t-1}	Matrix of lagged control variables see Table A1 for more details (in (3) is the second lag included)	Controls in level and dummy variables

Table 2. Growth rates for taxpayers, sorted by pre base year income

Lag structure			**2001 – 2003 – 2005**					**2002 – 2003 - 2004**			
			Log of taxable income		**Log of lagged taxable income**			**Log of taxable income**		**Log of lagged taxable income**	
Taxpayer type	**Income class (€)**	**N**	**Mean**	**Std-Dev.**	**Mean**	**Std-Dev.**	**N**	**Mean**	**Std-Dev.**	**Mean**	**Std-Dev.**
Married	≤ 200,000	6,531,961	0.018	0.272	0.031	0.278	6,532,295	0.010	0.215	0.010	0.216
	200,001 – 400,000	44,980	0.030	0.562	-0.013	0.543	44,095	0.023	0.460	-0.069	0.473
	400,001 – 600,000	7,035	0.054	0.689	-0.032	0.666	7,199	0.031	0.550	0.539	0.689
	600,001 – 800,000	2,455	0.094	0.725	-0.088	0.752	2,443	0.023	0.637	-0.109	0.583
	800,001 – 1,000,000	1,131	0.047	0.764	-0.049	0.757	1,219	0.048	0.625	-0.120	0.668
	> 1,000,000	2,484	0.088	0.821	-0.142	0.878	2,795	0.075	0.697	-0.122	0.742
	Income class (€)	**N**	**Mean**	**Std-Dev.**	**Mean**	**Std-Dev.**	**N**	**Mean**	**Std-Dev.**	**Mean**	**Std-Dev.**
Single	≤ 100,000	3,850,706	0.035	0.285	0.074	0.304	3,853,428	0.021	0.234	0.026	0.233
	100,001 – 200,000	33,515	-0.007	0.590	0.026	0.578	31,099	0.020	0.490	-0.064	0.479
	200,001 – 300,000	5,507	0.004	0.666	-0.003	0.675	5,152	0.036	0.532	-0.083	0.606
	300,001 – 400,000	1,890	0.0377916	0.695	-0.007	0.686	1,831	0.021	0.582	-0.066	0.570
	400,001 – 500,000	903	0.023	0.757	-0.065	0.763	831	0.061	0.532	-0.061	0.565
	> 500,000	2,087	0.078	0.846	-0.046	0.882	2,257	0.052	0.675	-0.105	0.729

Note: Growth rates are computed using observation weights delivered by the Federal Statistical Office

Table 3. 2SLS estimates for main income concepts, pooled full and restricted samples

Taxpayer type		Married			Single		
		(full sample)	**(< 1,000,000)**	**(< 800,000)**	**(full sample)**	**(< 500,000)**	**(< 400,000)**
Income Concept	**Covariate**	**Coefficient estimate**					
Statutory taxable income (**excluding** income from capital)	$\hat{\beta}_1$	1.27** (32.86)	1.10** (33.85)	1.07** (32.75)	0.83** (10.76)	0.68** (11.90)	0.62** (10.9)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.39** (-5.11)	0.04 (0.80)	0.12** (2.52)	0.07 (0.65)	0.31** (5.45)	0.39** (8.84)
	$\hat{\rho}$	0.06** (5.23)	0.13** (22.26)	0.15** (23.98)	0.13** (6)	0.19** (17.22)	0.21** (18.10)
	Long-term elasticity	-0.41** (-5.4)	0.04 (0.80)	0.14** (2.49)	0.08 (0.65)	0.37** (5.2)	0.49** (6.41)
Observations		644,614	637,714	634,504	276,170	270,576	268,176
Statutory taxable income	$\hat{\beta}_1$	1.24** (35.18)	1.16** (37.71)	1.13** (36.7)	0.97** (13.42)	0.83** (14.86)	0.78** (13.95)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.17** (-2.26)	0.07 (1.50)	0.14** (3.21)	0.06 (0.57)	0.30** (5.53)	0.38** (6.75)
	$\hat{\rho}$	0.08** (6.84)	0.12** (21.82)	0.13** (23.77)	0.13** (5.97)	0.19** (18.20)	0.20** (18.86)
	Long-term elasticity	-0.18** (-2.32)	0.08 (1.49)	0.17** (3.17)	0.07 (0.56)	0.37** (5.28)	0.47** (6.34)
Observations		646,888	639,966	636,750	279,218	273,614	271,208

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%. Observation numbers vary between income concepts due to technical requirements of the estimation procedure: sub-aggregates of the statutory taxable income might be negative, implying a marginal tax rate of 0. Results are shortened to two decimal places but rely on the un-shorted result.

Table 4. 2SLS estimates for alternative income concepts, pooled full and restricted samples

Taxpayer type		Married			Single		
		(full sample)	(< 1,000,000)	(<800,000)	(full sample)	(< 500,000)	(< 400,000)
Income Concept	**Covariate**	**Coefficient estimate**					
Taxable income (**excluding** income from capital **&** rent and lease)	$\hat{\beta}_1$	1.18** (32.87)	1.05** (33.23)	1.10** (32.59)	0.91** (12.42)	0.70** (12.74)	0.68** (12.37)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.37** (-5.44)	-0.01 (-0.17)	0.05 (1.03)	-0.13 (-1.18)	0.22** (3.96)	0.26** (4.76)
	$\hat{\rho}$	0.05** (4.24)	0.13** (20.79)	0.14** (21.95)	0.10** (4.40)	0.20** (16.81)	0.21** (16.93)
	Long-term elasticity	-0.39** (-5.74)	-0.01 (-0.17)	0.05 (1.02)	-0.13 (-1.21)	0.27** (3.82)	0.33** (4.53)
Observations		631,370	624,484	621,282	266,456	260,988	258,916
Adjusted Gross Income	$\hat{\beta}_1$	1.27** (32.83)	1.23** (40.41)	1.26** (42.33)	1.34** (15.5)	1.21** (19.67)	1.20** (20.19)
	$\hat{\beta}_1 + \hat{\beta}_2$	0.27** (6.74)	0.29** (8.42)	0.25** (7.33)	0.75** (18.81)	0.67** (18.17)	0.70** (19.60)
	$\hat{\rho}$	0.13** (13.89)	0.12** (21.41)	0.13** (23.90)	0.27** (10.16)	0.22** (17.04)	0.26** (19.59)
	Long-term elasticity	0.31** (6.97)	0.33** (8.50)	0.28** (7.39)	1.01** (16.57)	0.85** (17.67)	0.95** (18.49)
Observations		644,622	637,722	634,512	276,180	270,586	258,670

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%. Observation numbers vary between income concepts due to technical requirements of the estimation procedure: sub-aggregates of the statutory taxable income might be negative, implying a marginal tax rate of 0. Results are shortened to two decimal places but rely on the un-shorted result.

Appendix

Derivation of the dynamic model.

The basic model:

$$z_t = \alpha + \beta_1 n_t + \beta_2 n_{t-1} + W_{t-2}\gamma + \rho z_{t-1} + \eta + \varepsilon_t$$

First differencing of the basic model leads to:

$$\Delta z_t = \beta_1 \Delta n_t + \beta_2 \Delta n_{t-1} + \Delta W_{t-2}\gamma + \rho \Delta z_{t-1} + \gamma W_{t-2} + \Delta \varepsilon_t$$

The rearrangement of the specification gives us the final model specification:

$$\Delta z_t = \beta_1 \Delta^2 n_t + (\beta_1 + \beta_2)\Delta n_{t-1} + \Delta W_{t-2}\gamma + \rho \Delta z_{t-1} + \Delta \varepsilon_t$$

Table A1. Independent covariates

Variable		Description	Coding/ Construction
Income specific covariates	d_year	Indicates base year: 2001 or 2002	Dummy variable (1 = 2002; 0 = 2001).
	d_rent_lease	Income from rent and lease is main income source	Dummy var. (1 = status applies; 0 = else).
	d_agr_for	income from agriculture and forestry is main income source	(1 = status applies; 0 = else).
	d_business	income from trade business is main income source	(1 = status applies; 0 = else).
	d_self_emp	income from self-employment is main income source	(1 = status applies; 0 = else).
	d_emp	income from employment is main income source	(1 = status applies; 0 = else).
	d_cap	income from capital is main income source	(1 = status applies; 0 = else).
	inc_prog	tax free income, but subject to progression	Log of tax free income
Socio-demographic covariates	age	taxpayer´s age	Level of age
	age²	taxpayer´s age squared	Level of age squared
	d_two_earners	married taxpayers with two earners	Dummy variable (1 = two earners; 0 = one earner).
	d_child	children in taxpayer´s household	Dummy var. (1 = children; 0 = else).
	d_new_child	new child in taxpayer´s household in post reform year	Dummy var. (1 = new children; 0 = else).
	d_donator	taxpayer is a donator	Dummy var. (1 = donator; 0 = else).
	d_gender	taxpayer´s gender	Dummy var. (1 = female; 0 = male).
	d_disabled	taxpayer´s degree of disability exceeds 50	Dummy var. (1 = status applies ; 0 = else).
	d_single_p	taxpayer is a single parent	Dummy var. (1 = single parent; 0 = else).
	d_pensioner	taxpayer is a pensioner	Dummy var. (1 = pensioner; 0 = else).
	d_young	taxpayer´s age < 25	Dummy var. (1 = age < 25; 0 = else).
	d_old	taxpayer´s age > 55	Dummy var. (1 = age > 55; 0 = else).
	d_fed_st	taxpayer moves to another federal state	Dummy var. (1 = moves to another federal state; 0 = else).

Table A2. Mean growth rates, Weighted Observations

Variable	Married taxpayers (N=13,234,358)		Single taxpayers (N=7,852,406)	
	Mean	**Std-Dev.**	**Mean**	**Std-Dev.**
	Taxable income excluding income from capital			
Δz_{43}	0.009	0.215	0.018	0.234
Δz_{53}	0.018	0.271	0.031	0.285
	Taxable Income excluding income from capital and from rent & lease			
Δz_{43}	0.006	0.220	0.019	0.237
Δz_{53}	0.014	0.279	0.033	0.294
	Statutory taxable income			
Δz_{43}	0.010	0.219	0.021	0.238
Δz_{53}	0.019	0.276	0.035	0.290
	Adjusted gross income			
$\Delta z_{AGI,43}$	0.022	0.141	0.027	0.148
$\Delta z_{AGI,53}$	0.044	0.184	0.054	0.193

Table A3. Socio-demographic variables, Weighted Observations

Variable	Married taxpayers (N=13,234,358)		Single taxpayers (N=7,852,406)	
	Mean	**Std-Dev.**	**Mean**	**Std-Dev.**
d_rent_lease	0.006	0.083	0.012	0.110
d_agr_for	0.006	0.078	0.003	0.056
d_business	0.040	0.196	0.039	0.194
d_self_emp	0.025	0.156	0.024	0.154
d_emp	0.917	0.275	0.905	0.291
log_inc_prog	1.327	2.902	0.516	1.869
Age	46.214	32.930	41.115	34.862
age²	3220.190	63934.550	2905.84	65329.320
d_two_earners	0.683	0.464	---	---
d_child	0.543	0.425	0.287	0.601
d_new_child	0.042	0.213	0.011	0.011
d_donator	0.454	0.497	0.339	0.473
d_gender	0.001	0.041	0.478	0.499
d_disabled	0.033	0.180	0.028	0.167
d_single_p	<0.001	0.018	0.089	0.285
d_pensioner	0.039	0.194	0.050	0.219
d_young	0.003	0.056	0.094	0.292
d_old	0.164	0.370	0.125	0.330
d_fed_st	0.001	0.041	0.005	0.075

Table A4. First stage partial R^2

Taxpayer type		Married			Single		
		(full sample)	(< 800,000)	(<1,000,000)	(full sample)	(< 400,000)	(< 500,000)
Income Concept		First stage partial R^2					
Statutory taxable income (excluding income from capital **&** rent and lease)	Δn_t	0.0935	0.0930	0.0933	0.0529	0.0512	0.0521
	$\Delta n_t + \Delta n_{t-1}$	0.0791	0.0793	0.0793	0.0894	0.0905	0.0905
	$\log(z_{t-1})$	0.0662	0.0922	0.0933	0.0659	0.0758	0.0782
Statutory taxable income	Δn_t	0.0919	0.0922	0.0546	0.0512	0.0492	0.0501
	$\Delta n_t + \Delta n_{t-1}$	0.0801	0.0801	0.0834	0.0890	0.0897	0.0897
	$\log(z_{t-1})$	0.1059	0.1067	0.0656	0.0724	0.0847	0.0875
Statutory taxable income excluding income from capital & rent and lease	Δn_t	0.0989	0.0982	0.0986	0.0563	0.054	0.0554
	$\Delta n_t + \Delta n_{t-1}$	0.0792	0.0794	0.0794	0.0897	0.0909	0.0909
	$\log(z_{t-1})$	0.0601	0.0856	0.0869	0.0630	0.0729	0.0752
Adjusted gross income	Δn_t	0.0928	0.0919	0.0922	0.0517	0.0485	0.0494
	$\Delta n_t + \Delta n_{t-1}$	0.0749	0.0769	0.0765	0.0883	0.0905	0.0898
	$\log(z_{t-1})$	0.0405	0.0667	0.0666	0.027	0.0462	0.0483

Table A5. Correlation Matrix, Pooled

Married Taxpayers (N=13,234,358**)**				
	Log of Statutory taxable Income	Log of Taxable Income excluding capital	Log of Taxable Income excluding capital & rent and lease	Log of Adjusted Gross Income
Log of Statutory taxable Income	1.000	0.984	0.916	0.788
Log of Taxable Income excluding capital	0.984	1.000	0.909	0.774
Log of Taxable Income excluding capital & rent and lease	0.916	0.909	1.000	0.720
Log of Adjusted Gross Income	0.788	0.774	0.720	1.000
Single taxpayers (N=7,852,406**)**				
	Log of Statutory taxable Income	Log of Taxable Income excluding capital	Log of Taxable Income excluding capital & rent and lease	Log of Adjusted Gross Income
Log of Statutory taxable Income	1.000	0.976	0.915	0.772
Log of Taxable Income excluding capital	0.976	1.000	0.904	0.757
Log of Taxable Income excluding capital & rent and lease	0.915	0.904	1.000	0.707
Log of Adjusted Gross Income	0.772	0.757	0.707	1.000

Table A6. Adjusted gross income

Income from business activity (including income from agriculture and forestry, from unincorporated business enterprise and from self-employed activities)
+ wage income, income from renting and leasing and other income
+ earnings from capital investments (imputation of missing data on an average level)
+ all tax reliefs and tax allowances for income from business activity as far as identifiable
+ allowable expenses for wage and other income (consumptive character)
+ age relief
+ tax-exempted income from foreign countries
+ loan and income indemnification
+ life annuity income less income component (flat 70% of life annuity income)
+ tax shelters: losses from equity holdings
+ losses from business activity income and renting and leasing income, if the modified income class and the sum of income until this point is still negative (negative consumption is not possible)
- fixed income tax and solidarity surcharge
- alimony / child support
+ child benefit
= Adjusted Gross Income

Table A7. 2SLS estimates for statutory taxable income excluding income from capital

Taxpayer type		Married			Single		
		(full sample)	**(<1,000,000)**	**(<800,000)**	**(full sample)**	**(<500,000)**	**(<400,000)**
Income Concept	**Covariate**	**Coefficient estimate**					
Statutory taxable income (**excluding** income from capital)	Constant	0.187** (26.148)	0.191** (26.901)	0.195** (27.406)	0.193** (22.417)	0.191** (22.581)	0.193** (22.887)
	$\hat{\beta}_1$	1.271** (32.863)	1.104** (33.845)	1.066** (32.753)	0.827** (10.762)	0.681** (11.900)	0.622** (10.897)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.387** (-5.114)	0.038 (0.803)	0.119** (2.516)	0.072 (0.654)	0.306** (5.451)	0.390** (8.844)
	$\hat{\rho}$	0.055** (5.225)	0.133** (22.263)	0.146** (23.982)	0.125** (5.995)	0.187** (17.223)	0.207** (18.102)
	Long-term elasticity	-0.405** (-5.395)	0.043 (0.800)	0.139** (2.488)	0.082 (0.645)	0.371** (5.197)	0.485** (6.405)
	d_year	-0.022** (-11.923)	-0.017** (-9.960)	-0.015** (9.258)	-0.004 (-1.419)	-0.001 (-0.364)	<0.001 (0.351)
	d_rent_lease	-0.001 (0.228)	-0.001 (-0.277)	-0.004 (-0.637)	-0.038** (-5.115)	-0.034** (-4.109)	-0.030** (-4.020)
	d_agr_for	-0.070** (9.802)	0.067** (9.548)	0.065** (9.184)	0.058** (5.227)	0.065** (5.923)	0.063** (5.751)
	d_business	-0.026** (-4.652)	-0.025** (-4.293)	-0.026** (-4.573)	-0.042** (-6.159)	-0.034** (-5.043)	-0.035** (-5.222)
	d_self_emp	-0.059** (-10.349)	-0.053** (-9.308)	-0.054** (-9.399)	-0.048** (6.867)	-0.039** (-5.640)	-0.039** (-5.617)
	d_emp	-0.059** (-10.349)	-0.055** (9.902)	-0.057** (-10.285)	-0.085** (13.240)	-0.080** (-12.455)	-0.081** (-12.611)
	inc_prog	0.006** (26.622)	0.006** (25.788)	0.005** (25.487)	0.006** (11.605)	0.005** (11.355)	0.005** (10.899)
	age	-0.003** (-38.928)	-0.003** (-39.633)	-0.003** (-39.889)	-0.002** (-23.489)	-0.002** (-23.459)	-0.002** (-23.246)
	age^2	<0.001** (39.004)	<0.001** (39.707)	<0.001** (39.962)	<0.001** (23.460)	<0.001** (23.451)	<0.001** (23.250)
	d_two_earners	-0.034** (-31.429)	-0.032** (-30.652)	-0.032** (-30.516)	---	---	---
	d_child	0.015** (22.758)	0.015** (23.567)	0.015** (23.729)	0.009** (6.683)	0.009** (6.753)	0.009** (6.558)
	d_new_child	-0.008** (-2.669)	-0.009** (-3.300)	-0.009** (-3.171)	-0.020** (-3.276)	-0.020** (-3.358)	-0.019** (-3.137)
	d_donator	0.006** (5.760)	0.008** (7.376)	0.008** (7.761)	0.003** (2.047)	0.004** (2.364)	0.003** (2.166)
	d_gender	-0.047** (-4.081)	-0.055** (-4.756)	-0.054** (-4.659)	-0.013** (-7.236)	-0.013** (-7.810)	-0.014** (-8.127)
	d_disabled	0.013** (4.206)	0.010** (3.500)	0.010** (3.497)	-0.001 (-0.347)	-0.003 (-0.605)	-0.003 (-0.060)
	d_single_p	-0.017 (-0.716)	-0.016 (-0.686)	-0.016 (-0.675)	0.033** (10.010)	0.031** (9.636)	0.032** (9.754)
	d_pensioner	-0.036** (-10.067)	-0.033** (-9.275)	-0.033** (-9.370)	0.033** (6.647)	0.037** (7.464)	0.036** (7.169)
	d_young	-0.056** (-4.478)	-0.057** (-4.648)	-0.059** (-4.822)	-0.010** (-2.625)	-0.012** (-3.401)	-0.013** (-3.566)
	d_old	-0.014** (-7.547)	-0.012** (-6.903)	-0.012** (-6.724)	-0.012** (-3.195)	-0.012** (-3.337)	-0.013** (-3.481)
	d_fed_st	0.027 (1.677)	0.023 (1.416)	0.022 (1.415)	0.038** (3.519)	0.035** (3.344)	0.034** (3.269)
Observations		644,614	634,504	637,714	276,170	270,576	268,176

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%.

Table A8. 2SLS estimates for statutory taxable income

Taxpayer type		Married			Single		
		(full sample)	**(<1,000,000)**	**(<800,000)**	**(full sample)**	**(<500,000)**	**(<400,000)**
Income Concept	**Covariate**	**Coefficient estimate**					
Statutory taxable income	Constant	0.178**	0.181**	0.183**	0.190**	0.185**	0.184**
		(27.232)	(27.739)	(28.085)	(21.877)	(21.567)	(21.395)
	$\hat{\beta}_1$	1.243**	1.158**	1.125**	0.913**	0.661**	0.704**
		(35.177)	(37.713)	(36.698)	(12.419)	(11.988)	(12.714)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.168**	0.067	0.144**	-0.128	0.285**	0.221**
		(-2.264)	(1.500)	(3.207)	(-1.176)	(5.130)	(4.031)
	$\hat{\rho}$	0.076**	0.121**	0.134**	0.100**	0.212**	0.196**
		(6.835)	(21.817)	(23.771)	(4.400)	(17.412)	(16.916)
	Long-term elasticity	-0.181**	0.075	0.166**	-0.134	0.361**	0.274**
		(-2.319)	(1.491)	(3.165)	(-1.209)	(4.868)	(3.883)
	d_year	-0.017**	-0.014**	-0.013**	-0.010**	-0.003	-0.005
		(-9.604)	(-8.823)	(-8.132)	(-3.264)	(-1.308)	(-1.871)
	d_rent_lease	0.007	0.007	0.006	-0.042**	-0.020	-0.022
		(1.248)	(1.319)	(1.109)	(-3.333)	(1.673)	(-1.801)
	d_agr_for	0.077**	0.076**	0.074**	0.058**	0.064**	0.067**
		(11.731)	(11.707)	(11.478)	(5.247)	(5.894)	(6.093)

	d_business	-0.012**	-0.012**	-0.013**	-0.036**	-0.028**	-0.026**
		(-2.361)	(-2.346)	(-2.541)	(-5.144)	(-4.002)	(-3.838)
	d_self_emp	-0.044**	-0.039**	-0.042**	-0.048**	-0.037**	-0.037**
		(-8.678)	(-8.149)	(-8.141)	(-6.610)	(-5.226)	(-5.168)
	d_emp	-0.040**	-0.039**	-0.041**	-0.079**	-0.074**	-0.072**
		(-8.080)	(-7.976)	(-8.244)	(-11.741)	(-11.096)	(-10.859)
	inc_prog	0.006**	0.005**	0.005**	0.006**	0.005**	0.006**
		(26.189)	(26.249)	(25.994)	(13.285)	(12.485)	(12.832)
	age	-0.003**	-0.003**	-0.003**	-0.003**	-0.002**	-0.002**
		(-42.378)	(-43.080)	(-43.256)	(-25.578)	(24.535)	(-24.965)
	age^2	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**
		(43.354)	(43.053)	(43.229)	(25.472)	(24.461)	(24.881)
	d_two_earners	-0.033**	-0.032**	-0.032**	---	---	---
		(-32.147)	(-31.523)	(-31.341)			
	d_child	0.015**	0.015**	0.015**	0.011**	0.010**	0.010**
		(23.945)	(24.563)	(24.775)	(7.954)	(7.379)	(7.694)
	d_new_child	-0.010**	-0.011**	-0.011**	-0.020**	-0.019**	-0.020**
		(-3.567)	(-3.933)	(-31.341)	(-3.429)	(-3.255)	(-3.424)
	d_donator	0.006**	0.007**	0.079**	0.001	0.001	0.002
		(6.120)	(6.948)	(7.336)	(0.612)	(1.093)	(1.256)
	d_gender	-0.045**	-0.050**	-0.048**	-0.009**	-0.011**	-0.011**
		(-4.064)	(-4.459)	(-4.354)	(-5.575)	(-6.809)	(-6.456)
	d_disabled	0.001**	0.009**	0.009**	0.001	-0.001	-0.001
		(3.738)	(3.227)	(3.232)	(0.218)	(-0.229)	(-0.226)
	d_single_p	-0.013	-0.014	-0.013	0.035**	0.034**	0.033**
		(-0.556)	(-0.599)	(-0.591)	(10.867)	(10.580)	(10.411)
	d_pensioner	-0.027**	-0.026**	-0.026**	0.023**	0.027**	0.027**
		(-8.087)	(-7.682)	(-7.721)	(4.261)	(4.942)	(4.972')
	d_young	-0.061**	-0.062**	-0.063**	-0.010**	-0.013**	-0.013**
		(-5.062)	(-5.145)	(-5.313)	(-2.841)	(-3.839)	(-3.869)
	d_old	-0.012**	-0.062**	-0.011**	-0.005	-0.007**	-0.007**
		(-7.098)	(-5.145)	(-6.403)	(-1.412)	(-2.039)	(-1.988)
	d_fed_st	0.021	0.018	0.017	0.040**	0.035**	0.035**
		(1.325)	(1.212)	(1.163)	(3.785)	(3.416)	(3.466)
Observations		646,888	639,966	636,750	266,456	258,916	261,174

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%.

Table A9. 2SLS estimates for statutory taxable income excluding income from capital and rent and lease

Taxpayer type		Married			Single		
		(full sample)	(<1,000,000)	(<800,000)	(full sample)	(<500,000)	(<400,000)
Income Concept	**Covariate**	**Coefficient estimate**					
Statutory taxable income (**excluding** income from capital **&** rent and lease)	Constant	0.192** (26.386)	0.194** (26.693)	0.199** (27.389)	0.190** (21.877)	0.184** (21.386)	0.185** (21.485)
	$\hat{\beta}_1$	1.177** (32.872)	1.046** (33.226)	1.021** (32.590)	0.913** (12.419)	0.705** (12.738)	0.682** (12.369)
	$\hat{\beta}_1 + \hat{\beta}_2$	-0.374** (-5.442)	-0.008 (-0.173)	0.046 (1.025)	-0.128 (-1.176)	0.218** (3.958)	0.263** (4.757)
	$\hat{\rho}$	0.046** (4.235)	0.130** (20.791)	0.140** (21.945)	0.100** (4.400)	0.196** (16.808)	0.206** (16.935)
	Long-term elasticity	-0.392** (-5.735)	-0.250** (-4.302)	0.053 (1.021)	-0.134 (-1.209)	0.271** (3.815)	0.331** (4.534)
	d_year	-0.023** (-12.683)	-0.019** (-11.235)	-0.018** (-10.828)	-0.010** (-3.264)	-0.005 (-1.888)	-0.004 (-1.538)
	d_rent_lease	<-0.001 (-0.098)	0.009 (1.002)	0.007 (0.810)	-0.042** (-3.333)	-0.022 (-1.764)	-0.022 (-1.751)
	d_agr_for	0.077** (10.473)	0.074** (10.151)	0.070** (9.651)	0.058** (5.247)	0.068** (6.151)	0.066** (5.98)
	d_business	-0.020** (-3.434)	-0.022** (-3.652)	-0.026** (-4.342)	-0.036** (-5.144)	-0.026** (-3.703)	-0.027** (-3.853)
	d_self_emp	-0.055** (-9.246)	-0.053** (-8.962)	-0.057** (-9.511)	-0.048** (-6.610)	-0.036** (-5.026)	-0.037** (-5.168)
	d_emp	-0.046** (-7.941)	-0.048** (-8.281)	-0.053** (-9.046)	-0.079** (-11.741)	-0.072** (-10.79)	-0.074** (-11.023)
	inc_prog	0.006** (26.320)	0.005** (26.010)	0.006** (25.85)	0.006** (13.285)	0.006** (12.866)	0.006** (12.605)
	age	-0.003** (-43.637)	-0.004** (-43.746)	-0.004** (-43.936)	-0.003** (-25.578)	-0.003** (-25.083)	-0.003** (-24.673)
	age²	<0.001** (46.691)	<0.001** (43.808)	<0.001** (43.999)	<0.001** (25.472)	<0.001** (24.998)	<0.001** (24.595)
	d_two_earners	-0.030** (-29.005)	-0.029** (-28.109)	-0.029** (-27.951)	---	---	
	d_child	0.015** (23.874)	0.016** (24.4481)	0.016** (24.71)	0.001** (7.954)	0.011** (7.646)	0.010** (7.396)
	d_new_child	-0.009** (-3.195)	-0.011** (-3.762)	-0.011** (-3.69)	-0.020** (-3.429)	-0.020** (-3.433)	-0.019** (-3.25)
	d_donator	0.004** (3.780)	0.005** (5.197)	0.006** (5.478)	0.001 (0.612)	0.002 (1.226)	0.0019 (1.084)
	d_gender	-0.066** (-5.412)	0.006** (5.245)	-0.07** (-5.710)	-0.009** (-5.575)	-0.011** (-6.422)	-0.011** (-6.689)
	d_disabled	0.013** (4.428)	-0.071** (-5.798)	0.012** (3.951)	0.001 (0.218)	<-0.001 (-0.078)	0.001 (0.111)
	d_single_p	-0.015 (-0.649)	0.012** (3.860)	-0.017 (-0.738)	0.035** (10.867)	0.034** (10.463)	0.034** (10.613)
	d_pensioner	-0.038** (-10.347)	-0.017 (-0.7231)	-0.033** (-8.97)	0.023** (4.261)	0.027** (5.0185)	0.028** (5.181)

	d_young	-0.060** (-4.949)	-0.033** (-8.966)	-0.062** (-5.16)	-0.010** (-2.841)	-0.014** (-3.894)	-0.013** (-3.745)
	d_old	-0.015** (-8.200)	-0.06** (-5.001)	-0.014** (-7.56)	-0.005 (-1.412)	-0.007 (-1.908)	-0.008** (-2.012)
	d_fed_st	0.029 (1.869)	0.028 (1.775)	0.027 (1.746)	0.004** (3.785)	0.036** (3.466)	0.036** (3.453)
Observations		644,622	637,722	634,512	276,180	270,586	258,670

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%.

Table A10. 2SLS estimates for adjusted gross income

Taxpayer type		**Married**			**Single**		
		(full sample)	**(<1,000,000)**	**(<800,000)**	**(full sample)**	**(<500,000)**	**(<400,000)**
Income Concept	**Covariate**	**Coefficient estimate**					
Adjusted gross income	Constant	0.160** (25.334)	0.161** (27.299)	0.159** (27.091)	0.116** (11.488)	0.121** (16.034)	0.113** (15.154)
	$\hat{\beta}_1$	1.269** (32.827)	1.227** (40.413)	1.261** (42.331)	1.343** (15.495)	1.205** (19.665)	1.202** (20.193)
	$\hat{\beta}_1 + \hat{\beta}_2$	0.274** (6.741)	0.287** (8.420)	0.245** (7.329)	0.745** (18.808)	0.669** (18.172)	0.702** (19.601)
	$\hat{\rho}$	0.125** (13.889)	0.120** (21.410)	0.134** (23.900)	0.273** (10.158)	0.217** (17.038)	0.261** (19.593)
	Long-term elasticity	0.313** (6.970)	0.326** (8.502)	0.282** (7.389)	1.010** (16.567)	0.854** (17.671)	0.949** (18.486)
	d_year	-0.009** (-4.486)	-0.010** (-6.237)	-0.010** (-6.237)	-0.014** (-3.191)	-0.008** (-2.645)	-0.009** (-3.197)
	d_rent_lease	-0.012** (-2.352)	-0.011** (-2.095)	-0.011** (-2.095)	-0.042** (-6.996)	-0.031** (-5.342)	-0.030** (-5.073)

	d_agr_for	0.030**	0.032**	0.032**	0.051**	0.056**	0.060**
		(5.127)	(5.574)	(5.574)	(5.604)	(6.426)	(6.903)
	d_business	-0.023**	-0.023**	-0.023**	-0.018**	-0.008	-0.007
		(-5.182)	(-5.162)	(-5.162)	(-3.391)	(-1.615)	(-1.310)
	d_self_emp	-0.037**	-0.036**	-0.036**	-0.013**	-0.002**	<-0.001
		(-8.101)	(-7.753)	(-7.753)	(-2.287)	(0.424)	(-0.081)
	d_emp	-0.036**	-0.036**	-0.035**	-0.036**	-0.031**	-0.028**
		(-8.147)	(-7.937)	(-7.937)	(-6.824)	(-6.107)	(-5.584)
	inc_prog	0.003**	0.003**	0.003**	0.003**	0.002**	-0.007**
		(12.868)	(15.670)	(15.670)	(6.608)	(6.560)	(6.963)
	age	-0.002**	-0.002**	-0.002**	-0.001**	-0.002**	-0.002**
		(35.884)	(-39.004)	(-39.004)	(-16.391)	(-22.180)	(21.082)
	age²	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**	<0.001**
		(36.225)	(39.303)	(39.303)	(16.431)	(22.168)	(21.082)
	d_two_earners	-0.026**	-0.025**	-0.025**	---	---	---
		(29.939)	(-29.388)	(-29.388)			
	d_child	0.002**	0.002**	0.002**	-0.006**	-0.007**	-0.007**
		(5.242)	(5.383)	(5.583)	(-5.818)	(-6.342)	(6.963)
	d_new_child	0.002	0.001	0.001	-0.008	-0.005	-0.004
		(0.910)	(0.718)	(0.718)	(-1.584)	(1.140)	(-0.995)
	d_donator	0.006**	0.006**	0.006**	0.002	0.002	0.001
		(7.108)	(6.960)	(6.960)	(1.412)	(1.836)	(1.208)
	d_gender	-0.030**	-0.033**	-0.033**	-0.090**	-0.009**	-0.009**
		(-3.182)	(-3.577)	(-3.577)	(-6.229)	(-6.755)	(-6.824)
	d_disabled	0.009**	0.008**	0.008**	-0.009	0.001	0.001
		(3.648)	(3.661)	(3.661)	(-0.218)	(0.369)	(0.419)
	d_single_p	0.016	0.013	0.013	0.004	0.004	0.004
		(0.834)	(0.712)	(0.712)	(1.754)	(1.524)	(1.858)
	d_pensioner	-0.013**	-0.012**	-0.012**	0.020**	0.021**	0.020**
		(-4.519)	(-4.428)	(-4.428)	(4.942)	(5.324)	(5.043)
	d_young	-0.051**	-0.052**	-0.052**	-0.010**	-0.011**	-0.011**
		(-5.074)	(-5.313)	(-5.313)	(-3.625)	(-3.907)	(3.836)
	d_old	0.001	0.002	0.002	0.005	0.006**	0.005
		(1.212)	(1.934	(1.934)	(1.873)	(2.087)	(1.856)
	d_fed_st	0.032**	0.033**	0.033**	0.040**	-0.011**	0.038**
		(2.475)	(2.579)	(2.579)	(4.564)	(-3.907)	(4.531)
Observations		644,622	637,722	634,512	276,180	270,586	268,186

Note: T values of coefficient estimates in brackets. ** denote a significant level at 99%.

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The demand for tax preparation services –Evidence from German non-business taxpayers

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The mutual impact of deferral labour taxation and capital income taxation on risk-taking behaviour: An experimental analysis

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Abstract

Does the timing of labour earnings taxation encroaches upon capital income taxation and individual risk-taking investment decisions, i.e. portfolio selection? This paper presents the results of a laboratory experiment that is, contrary to previous approaches, not restricted to the analysis of capital income taxation (fully taxable vs. tax-exempt investment earnings) and individual risk-taking, but adds other dimensions of taxation, i.e. deferral or immediate labour earnings taxation. Empirical findings support the view that tax framing effects affect tax burden visibility, changing individuals´ risk-taking propensity substantially. A tax system applying deferral taxation of labour earnings turns out to be more attractive to taxpayers with regard to risk-taking investment than immediate labour taxation with tax-exempt earnings from investment.

Keywords

Deferral labour taxation · Capital income taxation · Experimental tax research · Retirement accounts · Behavioural economics · Analysis of covariance

JEL classification

C91 · H24 · H31

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1 Introduction

Tax policy has various, often conflicting objectives. A hands-on approach to tax policy is often equated with the isolated examination and modification of certain tax schemes in tax law. Economists and economic science have used to focus on a single component of a tax system, however, too readily forget to look at the bigger picture. Capital income taxation is a primary concern in tax policy, covered by heated debates over its divisive nature. The tax treatment of capital income is a substantial but no isolated feature of every income tax system and needs to be evaluated in a wider context considering other substantial tax system components, such as the taxation of labour earnings.[1] The basic view on the issue of income taxation is to define a taxpayer´s biography as his/her cumulative tax burden over time, resulting from labour and (subsequent) capital income taxation. When thinking about the chronological order of taxation of labour and capital income, two general methods emerge. The first, more widely-used approach separates the two dimensions. It starts with the generation of labour earnings and its immediate taxation, followed by the taxpayer´s net-of-tax investment decision and the subsequent taxation of income from capital. The second, alternative method defers the taxation of labour earnings. Here, the investment decision is based on gross labour earnings. Labour earnings taxation is shifted to the end and takes place at the same time as the taxation of the investment earnings[2].[3] For the latter, there are basically three main principles in taxation (with an arbitrary number of variations): (1) Earnings from investment are taxed in full at ordinary rates. (2) Earnings from investment are exempted from the income tax base and taxed at a schedular tax rate, which is typically lower than the ordinary income tax rate. (3) Earnings from investment are exempted from the tax base and not subject to income taxation at all.

In Germany, the Retirement Income Act of 2005 has established new regulatory changes affecting the tax treatment during the labour income (saving) phase and future pension income. Its main feature is the gradual transition to a deferral taxation of contributions to private pension plans. Since obviously policymakers are paying more and more attention to the deferral aspect of taxation, empirical evidence for behavioural responses to deferral taxation of labour earnings could be

[1] For the sake of simplicity, the term “capital income” is used to cover both the positive difference (gains) and the negative difference (losses).

[2] When using the term “investment earnings”, I only refer to earnings from financial investments by taxpayers. I do not examine investment earnings by corporations or investment in human capital assets.

[3] A well-known application of deferral labour earnings taxation is the tax treatment of taxpayer´s investments in private pension plans. US individual retirement accounts (IRA) and the 401(k) retirement plan benefit from deferral taxation, meaning the postponement of taxes on a portion of labour income and subsequent investment returns until the withdrawal..

helpful and valuable for not only new scientific insights but also for tax policy makers, designing (more) effective tax systems.

This paper addresses the question how different combinations of labour and capital income tax rules affect taxpayers´ allocation strategy, i.e. their risk-taking behaviour. The remaining part of this paper is organised as follow. The second section gives an overview of the development of (experimental) research in the field of risky investment and capital income taxation. It also outlines the contribution of this study to the existing literature. The following section sets out the hypothesis and describes the experimental design. Empirical results are presented in the fourth section. The fifth section is devoted to a discussion of the major findings and their implication for tax policy.

2 Previous Research

Pros and cons of capital income taxation have emerged in the theoretical public finance literature over the last decades.[4] There has been considerable scientific and political debate on the question of whether and how earnings from investment should be included in the income tax base. Pioneer theoretical contributions by Fisher (1897), (1906) and (1937), Ramsey (1927) and Seltzer (1950) have ignited the debate on how the taxation of capital income "[…] can be easily applied in practice while being, at the same time, sound in theory."[5] Research in this area is approached from different economic angles. It can be roughly divided into two parts of economic science, i.e. macroeconomic vs. microeconomic research. At the macro level, the mobility of capital, the welfare cost of capital income taxation, its proper measurement have been the subject of a long and lively debate led by economists such as Kaldor (1937), Harberger (1964a, 1964b, 1966), Levhari and Sheshinski (1972), Andrews (1974), Atkinson and Stiglitz (1976), Feldstein (1976), Atkinson and Sandmo (1980), Stiglitz (1983), Slemrod (1988), Auerbach (1992) and Kaplow (1994). They advocate the elimination or the reduction of capital income taxation to foster capital accumulation and economic growth.

On a micro level, a primary concern in tax policy and economic science is the effect of taxation on the demand for risky assets. Asea and Turnovsky (1997) emphasize that "it is central to one of the most challenging questions facing academics and policymakers […]."[6] Domar and Musgrave (1944) pioneered the analysis of taxation and its impact on taxpayers´ propensity to invest in risky

[4] Poterba (2001) gives a comprehensive overview of debates and developments in this research area and emphasises "the tax rules that apply to income from capital are the most complicated part of most modern income tax systems."

[5] Fisher (1906), p. 3.

[6] Asea and Turnovsky (1997), p. 56.

assets. Successive theoretical and empirical literature suggests a wide range of dimensions, illustrating how capital income taxation may affect individual investment behaviour and risk-taking. Using general expected utility maximisation or general equilibrium models, theoretical contributions investigate the demand for risky assets induced by income, wealth or different forms of taxation (e.g. Mossin (1968), Stiglitz (1969), Finn (1977), Fellingham and Wolson (1978), Schneider (1980), Mintz (1981), Bamberg and Richter (1984), Bulow and Summers (1984), Balcer and Judd (1987), Bamberg and Richter (1988) and Weisbach (2004)).

Panel data methods and laboratory experiments are widely used in empirical tax research to identify tax effects on individual risky investments. Although a clear and precise separation is not always possible and necessary, empirical research typically approaches the role of capital income taxation in (1) the realization of profits (Yitzhaki (1979), Slemrod (1989), Burman and Randolph (1994), Landsman and Shackelford (1995), Mariger (1995), Auerbach et al. (2000), Auerbach and Siegel (2000), Auten and Clotfelter (2000), Eichner and Sinai (2000), Jacob and Alstadsaeter (2012)) , (2) determining the set and shifting of assets owned by an individual (Butters and Thompson (1953), Elton and Gruber (1978), Agell and Edin (1990), Maki (1996), Poterba and Weisbenner (2001)) and (3) the amount invested in and the choice between risky assets. The current study addresses the latter by a laboratory experiment approach.

Experiment-based research questions aim to identify either aggregated dimensions, i.e. market transactions, the pricing of risky assets and equilibrium prices, or risky asset investment by individuals. It is straightforward to describe the most prominent papers of both research fields in greater detail, i.e. experimental designs, economic environments and main empirical findings. From an aggregate perspective, Davis and Swenson´s experiment (1993) approaches neoclassical predictions of investment behaviour. An artificial economy with sequential market transactions was utilised. Three types of economic agents (factor sellers, output producers, and output buyers) interact with each other to simulate market behaviour and price setting. The research question addressed is whether a capital investment friendly tax system is eligible to foster investment in depreciable assets. Davis and Swenson´s results imply that accelerated tax depreciation or investment tax credits are eligible to stimulate demand for investment assets. Anderson and Butler (1997) examine how preferential treatments of capital gains, i.e. lower tax rate and an unlimited capital loss deduction, drives the market prices of risky assets. They find that market prices of risky assets are both affected by the level of the preferential tax rate and the amount of risk. An unlimited deduction for capital losses has no significant impact on the risky tax-favoured asset´s price. Boylan and Frischmann (2006) designed a set of experimental markets to examine how the degree of tax rate visibility influences trading prices and quantities. Students volunteered to participate as buyers

and sellers. Their findings indicate that buyers facing high tax complexity systematically overpay the sellers for the risky assets compared to their counterparts in low-complexity markets.

Swenson´s study (1989) has ignited the experimental analysis of taxation and its influence on individual investment decisions. 56 students served as buyers and sellers and participated in four separate markets sequentially. Swenson compares the tax induced demand for a riskless and a risky asset in different tax environments, i.e. no taxes, proportional taxes, progressive taxes with a limited loss offset, and proportional taxes with a tax credit. His findings are in line with predictions from theory, revealing that progressive (proportional) taxes decrease (increase) the demand for risky assets. Eliminating the tax credit, proportional taxes cause no significant increase in demand, contradicting the theory. King and Wallin (1990) designed two laboratory experiments for 60 student volunteers to examine the effect of income tax rate structures on the level of risky asset investment. Using a slightly different economic environment (no taxes, proportional taxes, progressive taxes), their results confirm that a progressive tax system reduces the holdings of risky assets, whereas investment decisions are merely distinguishable between the proportional tax and the no tax scenario. Meade´s examination (1990) addresses the lock-in effect caused by capital gains taxation. The 64 students participating in her study were required to choose between six investment options. Her main findings support the hypothesis that the deferral aspect of capital gains taxation induces a lock-in effect and hampers new risky investments. Meade concluded that the taxation of capital gains upon realisation does no help to foster the tax policy goal of promoting risky investments.

Conducting a repeated-measure experiment, Meade (1995) tested how different tax systems affect saving and risk-taking behaviour. Risk-taking behaviour is measured by the relative amount invested in the riskier of two assets available. In her experiment, 90 undergraduate students were assigned to different tax regimes, i.e. income and consumption tax regimes. Her between-subjects design included two groups and three treatments to analyse both income tax and consumption tax systems as well as future tax rate (un)certainty. Providing empirical support for previous analytical work, her experimental findings suggest that taxpayers rethink their risk-sharing arrangement, when the structure of a tax regime changes. Results indicate that the composition of a tax regime can have significant and multidimensional effects on taxpayer´s propensity to deal with risk. She finds that income (consumption) taxes encourage (discourage) risk-taking behaviour when the tax rate is known. Meade identifies different effects of future and present tax rate (un)certainty within the two tax regimes. When present and future tax rates are uncertain, risk-taking declines significantly with dissimilar extent for both tax systems. When these tax rates are certain, the consumption tax regime is neutral with respect to risk-taking.

Apart from these studies, the perception of taxation and the influence of tax framing on tax perception have been found to explain empirical observations deviating from theoretical predictions (Lewis (1978), Fujii and Hawley (1988), Rupert and Fischer (1995), Sausgruber and Tyran (2005), Chetty et al. (2009)). Tax framing effects are a useful tool to explain why individual behaviour deviates, when net-of-tax outcomes are described or presented differently. Cullis et al. (2006) emphasize that "the same underlying process can be framed very differently, so that individuals confronted with the same information cast in different forms (e.g. as a potential gain or loss, a decision tree or in words, etc.) can be induced to systematically alter their choices."[7] The resulting lower degree of tax system salience and/or taxpayers´ awareness of their true tax burden are assigned substantial explanatory power to rationalize irrational taxpayer behaviour.

This way of thinking has been incorporated in several experimental settings dealing with the analysis of capital income taxation and individual risk-taking. De Bartolome (1995) tested whether the average or marginal tax rate are used by taxpayers, when being confronted with risky investments. His findings indicate that the presentation of the tax schedule is of substantial importance for individual decision-making. The experimental set-up by Fochmann et al. (2012) models three tax treatments to examine the effect of various loss deduction rules. In each treatment (no taxation, proportional income taxation without loss deduction and proportional income taxation with capped or partial loss deduction), the two investment alternatives generate identical expected after-tax payoffs. Comparing the number of risk seeking and risk averse investors, Fochmann et al. found no significant difference in the case of without taxation. The same was true for the proportional income taxation without loss deduction rules. The introduction of a capped or partial loss deduction rule produced a substantial and significant perception bias towards risk seeking investment behaviour. Fochmann et al. concluded that the loss deduction rules in income taxation are overestimated by taxpayers, leading to an increased willingness to take risk.

Labour taxation usually precedes capital income taxation and taxpayers´ decision to take risk. This paper provides a promising approach on how to identify the extent to which taxpayers´ risky investment choices between two assets are affected, when different tax rules are applied to known labour earnings and uncertain future earnings from investment. It contributes to the empirical experiment-based literature and complements previous research in three ways.

First, contrary to previous experimental approaches, the analysis does not only cover capital income taxation but the coexistence of labour and capital income taxation within a tax system and offers a more realistic set-up. At least to my knowledge, there has not been yet an experimental approach,

[7] Cullis et al. (2006), p. 305.

combining deferral taxation of gross labour earnings with (preferential) capital income taxation in a real effort experiment. The addition of labour income taxation as an essential component of the overall taxation process offers the unique opportunity to control for different dimensions of taxation, affecting taxpayers´ investment behaviour. The student participants of the laboratory experiment were required to carry out a real effort task where real money had to be earned and could be invested in two different risky assets afterwards, modelling the often neglected labour component in experimental analysis. Contrary to other studies, participants were not endowed with exogenous or artificial money or investment points. This approach is eligible to simulate a more realistic economic environment in the laboratory experiment.

Second, opposing previous approaches by Swenson (1989) as well as King and Wallin (1990), risk-taking propensity is not measured by the relative or absolute risky asset holdings but by the overall portfolio variance, resulting from the relative demand for the two risky assets. This measure is more elaborate than the absolute or relative amount invested in the riskier asset. It accounts directly for the interdependence between the relative demands for the two risky assets and their impact on the overall portfolio variance, to which the taxpayer selects to be exposed. This approach can be considered a substantial methodological improvement.

Third, on the one hand the results confirm the appealing aspect of increased liquidity, resulting from deferral taxation of labour income. On the other hand they provide strong empirical evidence for the existence of tax framing effects, when income tax systems are realigned without changing the overall strain on the taxpayer. Deferral labour income taxation turns out to encroach upon the individual investment decision, i.e. the demand for portfolios with a higher variance ceteris paribus increases.

Empirical findings which are closer to individual behaviour in reality enable tax policymakers to discuss in greater detail the role and usefulness of deferral taxation in behavioural economics. This study provides helpful findings on risk-taking behaviour. It analyzes whether theoretical and empirical results derived from immediate labour taxation frameworks are still valid or need to be rethought, when the taxation of labour earnings is also considered or changes. The paper focuses on the joint impact of immediate and deferral taxation of taxpayers´ labour earnings and capital income taxation on risk-taking behaviour. This approach departs from previous, mostly theoretical work on tax-deferred investment opportunities through the use of a promising experimental research design. It broadens current empirical research by adding another dimension, i. e. tax-induced individual investment decisions after a real effort task. The experiment draws attention to the individual decision of private risk-taking, when different tax systems apply to the taxation of labour earnings

and investment earnings. To my knowledge, this paper also presents the first experimental investigation approaching the identification of a perception bias resulting from deferral earnings taxation and its "abnormal" consequences on individual risk-taking behaviour. By providing new insights into the effects of deferral taxation on microeconomic investment behaviour, the study advances the political and scientific debate on the appropriateness of different income tax systems, featuring a different degree of salience and net-of-tax visibility.

3 Methodology

3.1 Hypotheses

Economic theory does not provide any imperturbable axiomatic picture of how capital income taxation and individual risk-taking of investors are related. Describing their utility functions by plausible combinations of the related measures of absolute and relative risk aversion, most analytical contributions assert that the level of risky investment will increase when a proportional income tax applies to earnings from investment.[8] However, the seminal paper by Domar and Musgrave (1944) indicates that analytical precision blurs when an asymmetric treatment of profits and losses applies. Schneider´s (1980) critical voice reinforces the indeterminateness of taxation and individual risk-taking. He argues that "the effects of progressive taxation in general and of proportional taxation (except under very restrictive conditions) cannot be predicted […]". Previous approaches have produced rather ambiguous results, often challenging pure rational theoretical predictions. It is revealed that the empirical implementation of a tax system, assumptions about economic agents and their more or less comprehensive knowledge of the tax system are crucial for a possible discrepancy between theory and reality.

Most previous empirical studies consider capital income taxation and individual risk-taking in isolation by neglecting and/or eliminating other aspects of an income tax system such as its salience, taxpayer´s imperfect rationality, psychological effects and (mis)perceptions. The question whether the design of a proportional income tax system, comprising alternative tax rules for labour and capital income, dis- or encourage risk-taking has not been answered yet. Four different tax systems are used in the analysis of individual investment behaviour. The tax systems discriminate between the taxation of labour earnings and investment earnings. Table 1 depicts two (possible) dimensions of income taxation and their coexistence within an income tax system, creating four different tax regimes.

[8] A comprehensive illustration is given by King and Wallin (1990, p. 28).

Tax systems	Immediate or deferral taxation of gross labour earnings	Are earnings from investment subject to taxation?
A	Immediate	Yes
B	Immediate	No
C	Deferral	Yes
D	Deferral	No

Table 1 – Tax system structure

Experiments offer the unique opportunity of empirical tests to explore the genuine driving force of taxation on investment behaviour and shed light on the puzzling issue of taxation and risk-taking. The approach chosen in the laboratory experiment is not restricted to the analysis of capital income taxation only, but expands the economic environment by another dimension, i.e. the taxation of labour. Most analytical and empirical work has implicitly only addressed the relation between capital income taxation and individual risk-taking, ruling out the aspect of labour taxation. The combination of labour and capital income taxation is a more elaborate experimental set-up, challenging and complicating analytical rigor and precise empirical evidence.

There are four hypotheses to be tested, addressing taxpayers´ risk-taking behaviour. The term "risk-taking behaviour" is used to describe the individual decision of a taxpayer to choose between two assets, bearing a different amount of risk. The degree of individual risk-taking is measured by the overall portfolio variance, which depends on the relative amounts invested in the two assets. Participants had complete freedom, when deciding about their disposable earnings and their allocation strategy. They were allowed to invest in just one or both assets or nothing at all. Taxpayer *i* is more risk-taking than taxpayer *j*, if the portfolio variance selected by *i* is higher than the portfolio variance chosen by *j*.

When thinking about deferral taxation, a prominent argument is the appealing (main) effect of increased liquidity, resulting from the postponement of labour income taxation. It can be regarded as a tax incentive to stimulate individual risk-taking propensity. This effect should be observable for both scenarios where deferral taxation of labour earnings ceteris paribus applies. The first research hypothesis addresses the attribute of increased liquidity and can be stated as:

H_1: *In a tax system with deferral taxation of labour earnings (tax systems C and D), taxpayers select a riskier portfolio than in a tax system with immediate labour taxation (A and B).*

The second research hypothesis deals with another part of taxation, i.e. the influence of capital income taxation on risk-taking behaviour. In my experimental setting, capital income is either fully taxable or tax-exempt. The tax treatment implies a consistent treatment of positive and negative investment earnings within a tax system, meaning a complete or no loss offset in the case of a negative outcome. When earnings from investment are subject to taxation, the Treasury absorbs part of the investor's risk and can be regarded as a partial insurance against losses. Proportional capital income taxation with a homogeneous treatment of positive and negative earnings reduces positive and negative outcomes by the same percentage, leaving the relation between risk and yield unchanged. Although a complete loss offset alleviates the reduction in yield, an investor seeks to be compensated for reduced earnings from investment and is attracted by more risk in terms of portfolio variance. According to King and Wallin (1990, p. 28.), symmetric (capital income) taxation reduces the dispersion of the investment earnings and increases the attractivity of the riskier asset to the risk-averse investor. They postulate that taxpayers seek more risk, when there is a proportional tax on capital income than when there is no tax.[9] To put it simple: Does a change in capital income taxation induce an increase in risk-seeking investment behaviour? The second hypothesis tests these considerations and can be stated as:

H_2: *In tax systems with immediate labour taxation (A and B): The switch from tax exempt to fully taxable capital income reduces investor's risk and yield by the same amount. To compensate for tax-induced lower earnings from investment, investors will seek more risk and select a portfolio with a higher variance.*

The third and fourth research hypothesis addresses possible tax framing effects on individual risk-taking. First, changing the tax rules for labour earnings from immediate to deferral taxation could be perceived as a complication in the process of overall income taxation. It might offset the assumed increase in the selected portfolio variance, resulting from the change of the tax rules for capital income. The third hypothesis equals:

[9] King and Wallin (1990, p. 29).

H_3: *Tax systems with deferral labour taxation (C and D) complicate determining the exact degree of risk-sharing between the investor and the Treasury. A tax system concealing the full extent of risk-sharing prevents taxpayers from selecting a portfolio with more risk, when the taxation of capital income is changed.*

The overall net-of-tax earnings resulting from the combination of deferral labour taxation with taxable earnings from investment (tax system B) are identical to those subject to immediate labour taxation with tax-exempt earnings from investment (tax system C). Let y denote the gross labour earnings, s the tax rate applied to labour and investment earnings and r the return on investment, then the overall strain on the taxpayer within both tax systems is identical[10] and can be stated as:

$$(y \cdot (1+r)) \cdot (1-s) = y \cdot (1-s) \cdot (1+r).$$

When tax framing effects are ruled out, it is reasonable to expect no statistically significant difference between individual risk-taking behaviour in terms of the chosen portfolio variance between taxpayers within both tax systems. Changing capital income taxation and labour taxation´s point of time are mechanism of tax framing. The description and presentation of tax system components are assumed to weaken tax system salience and can alter taxpayer´s behaviour. One possible explanation is that the lower degree of tax system salience causes a positively biased perception. It makes taxpayers believe that they benefit more from lower tax burden by deferral taxation than by tax-exempt investment earnings. It is assumed that the deferral aspect of labour earnings taxation is more confusing to taxpayers than tax-exemption of investment earnings. This way of thinking implies that deferral labour taxation conceals the true tax burden on labour earnings, disappearing from taxpayers´ awareness. This perceived decrease of overall taxation results in a portfolio with a higher variance relative demand for a portfolio with a higher degree of risk. The fourth research hypothesis can be stated as:

H_4: *Comparing two tax systems putting an equal strain on the taxpayer´s overall earnings but presenting it differently, investors will show different risk-taking behaviour in terms of portfolio selection.*

[10] This identity is created within the defined experimental microcosm. The tax rate is invariant over time and certain and known to the taxpayers in the present and future.

3.2 The Experimental Setting

Experimental research in economics is widely accepted as an empirical method to approach the analysis of tax policy.[11] The advantages of experimental research is to provide control and knowledge of the economic environment, while producing only low costs to gather evidence on how tax incentives may affect individual and aggregate taxpayer behaviour.[12]

Instead of providing an exogenous financial endowment, which is to be invested in risky assets, the idea is to let the participants work for their earnings to derive a more realistic investment decision afterwards. A total of 96 students mostly enrolled in undergraduate business courses volunteered in the real effort experiment. The experiment took place in five runs between April 2011 and June 2011. Participants were randomly assigned to one of the five runs with no more than 25 volunteers each. Every single experiment run consisted of two parts, i.e. the real effort part and the investment part. The subjects had not been informed of the second part before the experiment started. The procedure of each run was identical. Before beginning the task, the subjects were given detailed instructions, e.g. as to how to use the computer to do the work, how the work task was rewarded, how to end the experiment. Once all instructions had been read, questions were answered. No working time restrictions were set.[13] Each individual was allowed to quit working whenever they wanted. They were required to make a real work-leisure decision, deciding not only on their individual work effort but also on their total working time. The cash payment depended on the individual work-effort, i. e. the total amount of work, and was received at the end of the task. The participants also received a sheet of paper informing them of the tax rate (60%) applied to their earnings. The individual task was to digitise solution sheets of a multiple choice exam. Each solution sheet that was digitised correctly was rewarded with a gross payment of EUR 0.30. The gross wage ranged from EUR 0.30 to 52.80 with a mean of EUR 19.05 for an average time commitment of 103.32 minutes and 70.58 digitised solution sheets. When concluding the working part, participants were asked to complete a post-experiment questionnaire to gather information about their personal background. While their overall earnings before taxes were calculated, the subjects were told about the second part of the experiment. It took place in a separate lecture room where further instructions and information were handed out to each participant: (1) The gross amount of money a subject earned, (2) The one-period investment decision between two assets (3)

[11] Alm (2010) surveys and assesses the development of behavioural economics. In particular, he discusses the metho dologies, applications and limitations of experimental economics.

[12] See Davis and Swenson (1988, p. 41.)

[13] Only four out of 96 students were willing to work more than the maximum working time of three hours.

The particular tax system applied to labour earnings and the earnings resulting from the investment in the risky assets.

Both assets (X and Y) are designed with an identical expected value but a different amount of risk (mean preserving spread), each featuring three possible outcomes which are distributed with equal probabilities. The outcomes of both assets are stochastically independent. X is the less risky asset with only non-negative outcomes. The range of possible outcomes is more spread for Y than for X, leading to a higher variance. Asset Y also involves the possibility of a loss with a probability of $\frac{1}{3}$, which has important implications with regard to the taxation of profits and losses resulting from investment. Assuming risk-averse investors, the lowest variance possible (Var(r)= 0.048) can be obtained by allocating an relative amount of 80% to asset X and 20% to Y, meaning a reduction in variance by one fifth through asset diversification. It is also controlled for a possible "erroneous" demand of taxpayers for the portfolio with the lowest variance. The need to combine the two assets to obtain the portfolio with the lowest variance might not be obvious to taxpayers. Therefore, all investors (n=22), who decided invest in asset X only, selecting a portfolio variance of 0.06, are assigned a "corrected" portfolio variance of 0.048.[14]

	Possible outcomes and probability distributions							
Asset	r(up)	p(up)	r(medium)	p(medium)	r(down)	p(down)	EV(r)	Var(r)
X	0.6	1/3	0.3	1/3	0	1/3	0.3	0.06
Y	0.9	1/3	0.3	1/3	-0.3	1/3	0.3	0.24

Table 2 – Available assets

Four different tax systems were to be tested, differing in two dimensions from each other. Each participant was randomly assigned to one tax system, i.e. one tax treatment, on the basis of which their individual investment decision was to be made. Labour earnings are either subject to immediate or deferral taxation, meaning that labour earnings are subject to taxation before or after the investment. Depending on the particular tax system, gross labour earnings (m) or net earnings ($n = m \cdot (1 - s)$) are the maximum amount available for investment. Moreover, tax systems A & C raise taxes on the earnings from on investment, whereas they are tax-exempt in tax systems B & D.

[14] The empirical analysis is done with both the original portfolio variances and the adjusted variances.

Tax systems	Immediate or deferral taxation of gross labour earnings?	Maximum amount to be invested	Earnings from investment are subject to taxation?	Net-of-tax amount after labour and capital income taxation
A (n=24)	Immediate	$n = m \cdot (1 - s)$	Yes	$n \cdot (1 + r \cdot (1 - s))$
B (n=24)	Immediate	$n = m \cdot (1 - s)$	No	$m \cdot (1 - s) \cdot (1 + r)$
C (n=24)	Deferral	m	Yes	$m \cdot (1 - s) \cdot (1 + r)$
D (n=24)	Deferral	m	No	$m \cdot ((1 - s) + r)$

Table 3 – Tax systems and maximal amount to be invested

Steuer-system	Arbeitseinkommens-besteuerung	Investitions-betrag	Kapital-einkommens-besteuerung	Nettobetrag
A (n=24)	Sofort	$n = m \cdot (1 - s)$	Ja	n × (1+ r × (1-s))
B (n=24)	Sofort	$n = m \cdot (1 - s)$	Nein	m × (1-s) × (1+ r)
C (n=24)	Nachgelagert	m	Ja	m × (1-s) × (1+ r)
D (n=24)	Nachgelagert	m	Nein	m × ((1-s) + r)

Under their assigned tax system, each subject had to decide how to allocate their earnings to the two assets.[15] When choosing between two risky assets with an identical expected return but a different amount of risk, participants are implicitly required to weigh the advantage of a possible greater

[15] Although investors were assumed to maximise their wealth, participants were also allowed not to invest their earnings.

return against the disadvantage of a possible negative return. Regarding the net-of-tax amount, the following ranking order for positive outcomes can be derived: $D \succ C \sim B \succ A$.

The experimental design is to analyse how the willingness of taxpayers to bear more risk can be manipulated by tax policy, not only by capital income taxation but also by labour income taxation. After the subjects had determined the proportions to invest in the two assets X and Y, the outcome of each asset was determined individually by rolling a dice twice. The subjects completed another ex post questionnaire. It included additional questions referring to their investment decision-making. They were paid privately and left. The subject pay averaged 10.47 euros, requiring a total time involvement of 113.78 minutes.

4 Empirical findings

4.1 Group-specific analysis

The empirical strategy is based on three steps. The first step aims to identify the effect of increased initial liquidity on risk-taking behaviour, provided by deferral labour income taxation. The second step is a group comparison to identify, whether the change in capital income taxation is perceived differently, when immediate or deferral taxation of labour earnings apply. Third, the research question whether the demand for riskier portfolios is influenced by tax framing, i.e. redesigning the process of income taxation without changing the overall strain on the taxpayers, is addressed.

Tax system	Subjects	No. of subjects investing only in risky asset X	No. of subjects investing in X and Y	No. of subjects investing only in riskier asset Y	No. of subjects investing neither in X nor in Y
A	24	13	7	3	1
B	24	6	12	5	1
C	24	0	15	9	0
D	24	3	11	10	0
Total	**96**	**22**	**45**	**27**	**2**

Table 4 – Tax systems and investment behaviour

Table 3 and 4 present group-specific investment decisions. Table 3 indicates that the number of individuals investing in only one or both assets differs substantially between the four groups. Table 4 depicts the mean portfolio variance for taxpayers, who underlie different tax treatments, revealing that risk-taking behaviour is not equal across the tax systems. Under tax system D (deferral taxation of labour earnings and tax-exempt earnings from investment) individuals select a portfolio with an average variance of 0.163, whereas individuals only select a portfolio with a mean variance of 0.083 under a tax system with immediate labour taxation and taxable earnings from investment.

Mean portfolio variance chosen by taxpayers, underlying different tax treatments		**Earnings from investment are subject to taxation**	
		Yes	**No**
Gross labour earnings are subject to immediate taxation	**Yes**	A: 0.083	B: 0.102
	No	C: 0.148	D: 0.164

Table 5 – Tax systems and mean portfolio variance

Mean net-of tax portfolio variance chosen by taxpayers, underlying different tax treatments		**Earnings from investment are subject to taxation**	
		Yes	**No**
Gross labour earnings are subject to immediate taxation	**Yes**	A: 0.012	B: 0.093
	No	C: 0.020	D: 0.145

Table 6 – Tax systems and mean net-of-tax portfolio variance

Testing statistical significance, I initially perform different two-sample proportion t-tests. A two-sample proportion t-test is helpful to determine whether differences between two proportions of independent samples are statistically significant. I conduct pairwise comparisons of different tax systems to test H_1 –H_4.

With respect to hypothesis H_1 comparing tax systems with immediate labour taxation (A and B) with those with deferral labour taxation (C to D)), the equality of means can be rejected on a 1% level of significance (p-value <0.001). Averaging the respective portfolio variances for A and B (0.093) as well as C and D (0.156), the absolute difference turns out to be statistically significant positive (>0) with a p-value of 0.035, meaning a relative increase in portfolio variance of almost 68%. The appealing effect of increased liquidity due to labour income tax postponement is found to

be empirically verified. A tax system providing an initial increased investment amount make investors select riskier portfolios. This result indicates that tax systems with deferral labour taxation can be regarded as an incentive to induce taxpayers´ willingness to select riskier portfolios.

H_2 addresses the long-time issue in theoretical as well as empirical work, asserting that risk-averse individuals will show more willingness to take risk, when a proportional tax on capital income is in effect compared to an environment with capital income taxation. Despite the analytical predictions of increased risk-taking behaviour, the level of mean portfolio variance selected by taxpayers under tax systems A and B does not differ significantly from each other (p-value=0.491). Imposing a tax on investment earnings does not increase the demand for a riskier portfolio and opposes theoretical rigor. This result is in line with the implications of experimental studies by Swenson (1989), King and Wallin (1990) and Fochmann et al. (2012), who also found only little (or none) empirical support for a positive impact of capital income taxation on individual risk-taking.

Hypotheses H_3 –H_4 address tax framing effects. First of all, H_3 refers to H_2 and cannot be tested without referring to the empirical test results for H_2. Since in the case with immediate labour income taxation there is no empirical support for a positive effect of capital income taxation on risk-taking behaviour, testing H_3 can neither confirm nor reject the existence of tax framing effects. Even in tax systems with the standard approach of immediate labour income taxation, the assumed relationship between a proportional capital income tax and individual risk-taking propensity is not empirically observable. When there is deferral taxation of labour earnings, the imposition of a capital income tax does not lead to less risk seeking by taxpayers, i.e. the selection of portfolios with a lower overall variance. In the case with deferral labour taxation, there is also no statistically significant difference (p-value= 0.362) between individual risk-taking propensity (in tax systems C and D). Modelling the dimension of labour taxation, theoretical predictions about capital income taxation and risk-taking are contradicted or at least found to be empirically not verifiable in the chosen experimental setting. The lack of empirical support is a strong hint how careful analytical findings must be interpreted and transferred to reality.

With respect to hypothesis H_4, tax framing effects are prominent. The equality of means for tax systems B and C can be rejected on a 5% level of significance. Moreover, the difference between the mean portfolio variances in tax system B and C is positive (>0) on a 5% level of significance (p-value <0.026). This finding provides clear empirical evidence that tax framing causes a substantial perception bias with regard to a tax system´s overall tax burden. Although the information given is the same, i. e. overall tax burden remains constant, the introduction of deferral taxation and elimination of capital income taxation produces significantly different investment behaviour. Even

with eliminating economic complexity in the laboratory, the group comparison challenges the view that taxpayers are capable to determine their overall tax burden, when different tax rules apply to different components in the process of income taxation. Tax framing appears to be one source for taxpayers´ lack of unanimous risk-taking behaviour. It is reasonable to assume that tax system salience is strongly affected by the realignment of tax rules. The result implies that tax framing conceals the overall tax burden, generating a deviation from a pure rational perspective regarding risk-taking behaviour.

Overall, the empirical testing provides strong evidence that the introduction of deferral taxation challenges the traditional view how capital income taxation and risk-taking investment behaviour are (supposed to be) related. On the one hand, multidimensionality of taxation softens empirical evidence by tax framing effects, lowering tax system salience and concealing tax burden visibility. On the other hand, my results indicate that the replacement of immediate by deferral labour taxation turns out to be a powerful tax policy instrument to foster investment in riskier assets. In line with previous findings there is no empirical evidence that capital income taxation fosters individual risk-taking behaviour as analytical work asserts.

4.2 ANOVA/ ANCOVA

The analysis of variance (ANOVA) offers a more profound testing of hypotheses. It allows comparing the means of populations, which are classified in two (or more) different ways. The two-way ANOVA contains two independent categorical variables or so called factors. In the experiment these factors are the “labour income taxation” and “capital income taxation” upon which four treatments are formed. The underlying between-subjects design is based on the idea that each combination of these factors is applied to a completely new group of subjects. Participants are only part of one of the four treatment groups. The dependent variable in two-way ANOVA is the selected portfolio variance, resulting from the allocation of disposable earnings to assets X and Y. The exploration via a boxplot graphic reveals group-specific patterns in the data. Figure 1 depicts statistics about the investment behaviour across the tax systems and visualises its intra- and intergroup dispersion, indicating remarkable differences between the four treatments.

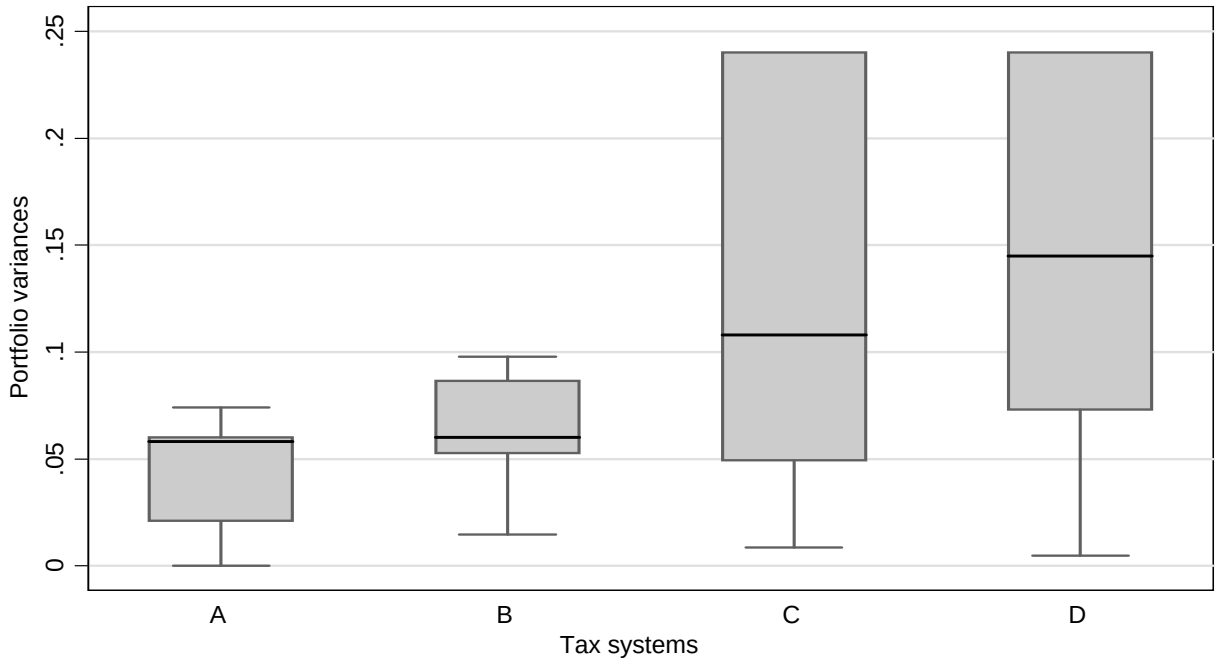

Figure 1 – Tax systems and selected portfolio variance

When controlling for other explanatory quantitative variables, the statistic tool is often called the analysis of covariance (ANCOVA). It combines elements from regression and analysis of variance. ANCOVA includes categorical and continuous variables and allows for the identification of a possible interdependency. The ANCOVA basic estimation equation is specified as:

$$\text{var}_i = \beta_0 + \beta_1 def + \beta_2 citax + \gamma_k' X_{ik} + \varepsilon_i \text{ with } X_{ik} = \begin{Bmatrix} disposable\ earnings \\ disposable\ earnings \square def \\ risk\ attitude \\ age \\ gender \end{Bmatrix}.$$

The dependent variable is the selected portfolio variance, denoted by var_i. It is continuous with only non-negative outcomes within a possible range of 0.00 to 0.24. β_0 is the unknown intercept, β_1 is the unknown parameter for the factor "labour income taxation" with two levels (deferral taxation and immediate taxation). Its abbreviation is *def* and equals 1 for deferral labour income taxation and 0 for immediate labour income taxation. β_2 is the unknown regression coefficient for the binary factor *citax*, indicating whether capital income is tax-exempt ($citax = 0$) or taxable ($citax = 1$). The base category is a tax system with immediate labour taxation and tax-exempt earnings from investment, i.e. tax system B. Following the principle of parameter parsimony, the model includes five unknown parameters, given by row vector γ_k'. They refer to socio-demographic

characteristics contained in column vector X_i for the i-th observation. The metric variable *disposable earnings* is included as a regressor to control for a possible level effect of the underlying gross labour income on the portfolio variance as the dependent variable. An interaction between disposable earnings and the factor "labour income taxation" is also included to account for a possible interdependence between the aforementioned level effect and the increased liquidity, resulting from the postponement of labour income taxation. Self-estimated personal *risk attitude* with values ranging from 1 to 10 is also included as a regressor.[16] The variable *age* is measured in years and metric; gender is binary and equals 1 for male respondents and 0 for female respondents. The latter is the base category.

Estimation results are presented in Table 5 containing the point estimate and the standard error of each covariate. In general, most coefficients are found to be not statistically significant. However, the results of ANCOVA indicate a statistically significant and pronounced main effect of the labour income tax treatment. The estimated coefficient for the factor "labour taxation" ($\hat{\beta}_1 = 0.065$) is highly significant with a p-value of 0.025, whereas the factor "capital income taxation" ($\hat{\beta}_2 = -0.017$) is neither economically nor statistically significant on a reasonable level of confidence.

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.065*	0.028	0.025	0.008 - 0.122
citax				
0	(base)			
1	-0.017	0.016	0.285	-0.050 - 0.014
disposable earnings	-0.003	0.002	0.125	-0.007 - 0.001

[16] The questionnaire contains questions on personal risk attitudes. On a scale from 1 (risk averse) to 10 (risk seeking), participants are asked to assess their risk-taking propensity. An indirect query of personal risk preferences via Arrow Pratt measure could also have been a valuable alternative. See Huang and Litzenberger (1988) for further information. Since the measurement of (self-estimated) personal risk attitudes might be problematic, the basic equation was also estimated without the self-estimated risk attitude as a regressor. Estimations results were not significantly different in size and direction.

disposable earnings□def	0.001	0.002	0.671	-0.003 - 0.005
risk attitude	0.021	0.016	0.189	-0.011 - 0.053
age	0.001	0.002	0.451	-0.002 - 0.005
gender				
0	(base)			
1	0.027	0.016	0.095	-0.005 - 0.060
constant	0.080	0.051	0.117	-0.020 - 0.181

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.186, Root MSE= 0.0776

Table 6 – ANCOVA estimates for basic equation

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.051*	0.024	0.038	0.002 - 0.098
citax				
0	(base)			
1	-0.061*	0.016	0.014	-0.094 - -0.028
disposable earnings	-0.003*	0.001	0.034	-0.006 - -0.002
disposable earnings□def	0.001	0.002	0.237	-0.013 - 0.005
risk attitude	0.018	0.011	0.128	-0.041 - 0.053
age	0.001	0.001	0.730	-0.002 - 0.003
gender				
0	(base)			
1	0.032	0.012	0.008	0.008 0.056
constant	0.097	0.037	0.011	0.023 - 0.171

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.4973, Root MSE= 0.05593

Table 7 – ANCOVA estimates for basic equation

The findings provide empirical evidence that the tax treatments are perceived differently. They are not equally eligible to increase taxpayers´ risk-taking propensity, i.e. favouring portfolios with a higher overall variance. ANCOVA identifies deferral labour income taxation to be a powerful/effective tax incentive to induce more risk-seeking. The change of labour income taxation make taxpayers alters their investment allocation between the risky assets fundamentally. On basis of immediate labour taxation (as the base category), the taxation of capital income does not affect

taxpayer´s portfolio selection. Although this result is not in line with most analytical work, similar results have been often found in previous studies. The result´s value value for tax policy design cannot be underestimated. It heats up the academic and political debate whether the taxation of capital income can be considered as an incentive to foster riskier investment behaviour. Proponents of capital income taxation often argue that the Treasury absorbs part of the investor's risk and can be regarded as a partial insurance against possible losses, fostering risk-taking behaviour by taxpayers. Controlling for the dimension of labour income taxation, the hypothesis, that risk-sharing between the investor and the Treasury is appealing and increases individual risk-taking propensity, is clearly not empirically supported.

From a fiscal point of view, the beauty of deferral taxation is the postponement of taxation, whereas the exemption of investment earnings means forgone tax revenues. From a fiscal point of view, deferral labour income taxation kills two birds with one stone: it is perceived as an appealing incentive to make taxpayers demand riskier portfolios while securing the overall income tax revenues in the long-run. If German tax policy aims to foster risk-seeking investment behaviour on income tax revenue- friendly basis, the ANCOVA estimation implies a strong and distinct preference for deferral labour taxation.

Surprisingly, the point estimates for *disposable earnings* ($\hat{\gamma}_1 = -0.003$) and the interaction term between *disposable earnings* and *def* ($\hat{\gamma}_2 = 0.001$) do not reveal a significant effect on the subject´s demand for riskier portfolios. The implications are clear: First, there is no level effect of disposable earnings on portfolio selection, meaning that taxpayers, who earned a greater amount of gross labour earnings, cannot be statistically distinguished from taxpayers with less gross labour earnings regarding their risk-taking behaviour. The insignificant interaction term implies that the level effect cannot be induced within tax systems where deferral labour income taxation applies. To put it non-technical: Taxpayers with a greater amount of gross labour income do not demand riskier portfolios, even if the taxation of their labour income is postponed.

Predicting the variance of the selected portfolio with ANCOVA is intuitive. A participant (base categories for both factors) in a tax system with immediate labour income taxation and tax-exempt capital income (tax system B) is expected to select a portfolio with a variance of 0.080. Assuming that the factor "labour income taxation" (variable *def*) changes its level from zero to one, the predicted portfolio variance increases by 0.065 (in absolute terms), meaning almost a doubling of portfolio variance. Controlling for the influence of the taxpayer´s gender, the ANCOVA indicates that a male participant selects a portfolio variance with 0.107 compared to a female participant. In relative terms, this increase slightly exceeds one fourth.

To test whether the interaction of both factors might be significant, an interaction term is added to the above estimation equation. This specification produces no statistically significant result for the interaction of both tax incentives. Reducing the number of model parameters, several other specifications are also estimated but do not represent a statistically significant interaction. Even the modelling of portfolio variance (the response variable) as a function of *def* , *citax* and their interaction does not produce statistically significant results (See Table A1-A5 in the Appendix for further details). Assuming risk-averse investors, it is also controlled for a possible "erroneous" demand of taxpayers for the portfolio with the lowest variance. When deciding about the investment of disposable earnings, the portfolio with a lowest variance possible (0.048) can be obtained by the allocating a relative amount of 80% to asset X and the other 20% to asset Y, whereas the complete investment in asset X means a portfolio variance of 0.06. Since this fact not be obvious to taxpayers, all investors (n=22) with selected portfolio variance of 0.06 are assigned a "corrected" portfolio variance of 0.048. Neither the two-sample proportion t-test nor the ANCOVA have produced deviating results with regard to significance and direction of the estimated parameters.[17]

Summing up, ANCOVA is a more powerful statistical tool than two-sample proportion t-tests. It allows for the estimation of the impact that categorical variables may have on the demand for riskier portfolios while also controlling for socio-demographic (continuous) explanatory variables. The preferred specification only exhibits a substantial positive influence of one of the main variables of interests on taxpayers´ risk-taking investment behaviour. An alternative tax treatment of labour earnings turns out to increase taxpayers´ willingness to take risk when they have to make investment decisions.

5 Summary and Conclusions

This study addresses the question as to how different tax systems applied to taxpayers´ labour and investment earnings affect the allocation strategy, i.e. the risk-taking behaviour displayed by taxpayers. At the core of the experimental analysis are four different designs of a tax system, affecting of individual investment behaviour. The tax systems discriminate between the taxation of labour earnings and investment earnings. The experimental approach combines a real effort task where real money had to be earned with a subsequent investment decision between two risky assets. On basis of a real effort experiment, it is a promising and new approach to model and analyse four different tax systems featuring deferral taxation of gross earnings in connection with capital income

[17] The two samples proportion tests and ANCOVA estimation results on basis of the adjusted portfolio variances are given in the Appendix (A6-A11).

taxation. The addition of another income taxation dimension creates a more realistic economic environment in the laboratory allows deriving more reasonable behavioural responses than in previous studies. Although the limitations of experimental tax research are well known and sometimes hamper the generalizability of the laboratory results to the field, empirical tax research finds its justification in making tax policy recommendations. The implications of this study are clear:

(1) The postponement of taxes on investment or other earnings appears to be an attractive incentive to taxpayers´ and lives up to its promise. A primary concern of tax policymakers is the impact of tax-deferred contributions on pension plans. My findings provide strong empirical support for tax deferral as proper measure to increase these contributions. (2) The study also provides grist to the mills of the opponents of a preferential tax treatment of investment earnings. Its much vaunted positive externality of influencing taxpayers´ propensity to undertake risky investments has not been empirically verified in the laboratory environment, when immediate or deferral labour income taxation applies. (3) The balancing act between budget consolidation and setting incentives for private investment requires a careful weighing up of different tax policy measures. The ANCOVA estimates indicate that deferral taxation of earnings is a powerful tax incentive in fostering risk-taking behaviour. With regard to income tax revenues, deferral taxation puts less pressure on the public budget than the exemption of capital gains from taxation, providing additional strong arguments for expanding the application of deferral taxation in modern tax systems.

Future experimental tax research should focus on the sample size and its composition. Although student participants are widely accepted and easily available, a more representative choice of participants would shed more light on the results´ validity and improve their transferability to reality. Several measures obtained from the same subject would be helpful in many ways. First, repeated decision-making in laboratory experiments is useful to identify participants´ learning effects and their (in)consistency in decision-making. Second, repeated decision-making creates more data on individual (investment) behaviour. This additional information paves the way for more elaborate statistical procedures accounting for experimental designs with repeated measures. Third, varying the degree of deferral taxation of gross earnings can be implemented in a repeated-measure design, examining not only heterogeneous responsiveness between subjects but also the subject´s inner responsiveness under a number of different tax treatments.

Appendix

Table A1. ANOVA only including tax treatments as factors

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.058***	0.016	<0.001	0.026 - 0.091
citax				
0	(base)			
1	-0.016	0.016	0.314	-0.049 - 0.016
constant	0.086***	0.014	<0.001	0.058 - 0.114

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.105, Root MSE= 0.081

Table A2. ANOVA including tax treatments as factors and their interaction

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.059*	0.023	0.012	0.013 - 0.105
citax				
0	(base)			
1	-0.015	0.023	0.497	-0.062 - 0.0393
def□cgf	-0.001	0.033	0.957	-0.067 - 0.064
constant	0.085***	0.016	<0.001	0.053 - 0.117

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.096, Root MSE= 0.082

Table A3. ANCOVA basic specification including interaction term of factors

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.067*	0.033	0.047	0.001 - 0.134
citax				
0	(base)			
1	- 0.015	0.023	0.517	-0.061 - 0.031
def exempt	- 0.004	0.032	0.885	-0.070 - 0.060
disposable earnings	0.032	0.002	0.127	-0.007 - 0.000
disposable earnings def	<0.001	0.002	0.697	-0.003 - 0.005
risk attitude	0.021	0.016	0.189	-0.054- 0.010
age	0.001	0.001	0.447	- 0.002 - 0.005
gender				
0	(base)			
1	0.027	0.016	0.106	-0.005 - 0.060
constant	0.078	0.052	0.133	-0.024 - 0.182

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.177, Root MSE= 0.078

Table A4. ANCOVA excluding risk attitude, age, gender and interaction term

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.066*	0.028	0.023	0.009 - 0.124
citax				
0	(base)			
1	-0.023	0.016	0.143	-0.055 - 0.008
disposable earnings	0.003	0.002	0.112	-0.007 – 0.000
disposable earnings def	<0.001	0.002	0.706	-0.003 – 0.005
constant	0.122***	0.022	0.001	0.077 - 0.167

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.162, Root MSE= 0.078

Table A5. ANCOVA including interaction term of factors and excluding risk attitude, age and gender

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.068*	0.033	0.046	0.001 - 0.136
citax				
0	(base)			
1	-0.022	0.022	0.333	-0.067 - 0.023
def#cgf	0.003	0.032	0.919	-0.066 - 0.062
disposable earnings	0.003	0.002	0.113	-0.007 - 0.000
disposable earnings#def	0.001	0.002	0.709	-0.003 - 0.05
constant	0.121***	0.024	<0.001	0.073 - 0.169

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.152, Root MSE= 0.079

Table A6. Two sample proportion tests with adjusted portfolio variance

Hypothesis	Tax systems	Means	95% Conf. interval	P-values
1	A and B vs. C and D	0.074 vs. 0.136	0.053 – 0.096 vs. 0.110 – 0.162	H1a: difference ≠0 p-value: <0.001 H1b: difference<0 p-value: 0.002
2	A vs. B	0.127 vs. 0.144	0.088 – 0.166 vs. 0.108 – 0.181	H1a: difference ≠0 p-value: 0.510 H1b: difference<0 p-value: 0.255
3	C vs. D	0.065 vs. 0.089	0.036 – 0.095 vs. 0.055 – 0.124	H1a: difference ≠0 p-value: 0.275 H1b: difference<0 p-value: 0.137
4	B and C	0.089 vs. 0.127	0.088 – 0.166 vs. 0.055 vs. 0.124	H1a: difference ≠0 p-value: 0.139 H1b: difference<0 p-value: 0.0699

Table A7. ANOVA only including tax treatments as factors

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.061***	0.016	<0.001	0.028 - 0.094
citax				
0	(base)			
1	-0.017	0.016	0.307	-0.050 - 0.015
constant	0.082***	0.014	<0.001	0.054 - 0.111

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.115, Root MSE= 0.082

Table A8. ANOVA including tax treatments as factors and their interaction

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.061**	0.023	0.010	0.015 - 0.108
citax				
0	(base)			
1	-0.017	0.023	0.468	-0.063 - 0.029
def#cgf	-0.001	0.033	0.998	-0.066 - 0.066
constant	0.082***	0.016	<0.001	0.053 - 0.115

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.105, Root MSE= 0.082

Table A9. ANCOVA basic specification including interaction term of factors

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.071*	0.034	0.037	0.004 - 0.139
citax				
0	(base)			
1	- 0.016	0.023	0.492	-0.063 - 0.030
def#citax	- 0.003	0.033	0.926	-0.069 - 0.063
disposable earnings	0.029	0.002	0.161	-0.007 - 0.001
disposable earnings#def	<0.001	0.002	0.749	-0.003 - 0.005
risk attitude	0.021	0.016	0.192	-0.054- 0.011
age	0.001	0.001	0.464	- 0.002 - 0.005
gender				
0	(base)			
1	0.027	0.016	0.11	-0.005 - 0.061
constant	0.074	0.052	0.160	-0.030 - 0.179

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.179, Root MSE= 0.079

Table A10. ANCOVA excluding risk attitude, age, gender and interaction term

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.071*	0.029	0.016	0.013 - 0.123
citax				
0	(base)			
1	-0.024	0.016	0.143	-0.056 - 0.008
disposable earnings	0.003	0.002	0.144	-0.007 – 0.001
disposable earnings□def	<0.001	0.002	0.780	-0.003 – 0.005
constant	0.116***	0.022	0.001	0.071 - 0.162

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.166, Root MSE= 0.079

Table A11. ANCOVA including interaction term of factors and excluding risk attitude, age and gender

Covariate	Coefficient	Standard error	P-value	95% Conf. interval
def				
0	(base)			
1	0.072*	0.034	0.037	0.004 - 0.141
citax				
0	(base)			
1	-0.023	0.023	0.317	-0.067 - 0.022
def□citax	0.001	0.032	0.960	-0.066 - 0.063
disposable earnings	0.003	0.002	0.146	-0.007 - 0.001
disposable earnings□def	<0.001	0.002	0.782	-0.003 - 0.05
constant	0.116***	0.024	<0.001	0.067 - 0.164

Note: Asterisks denote the respective significance level at 95% (*), 99% (**) and 99.9 (***). The Adj. R^2 is 0.156, Root MSE= 0.080

Fragebogen Experiment Teil 1

1. Tragen Sie hier bitte Ihre Teilnehmernummer ein:

_____

2. Wie fanden Sie die Tätigkeit, die Sie während des Experimentes ausüben sollten auf einer Skala von 1 = „sehr unangenehm“ bis 10 = „sehr angenehm“?

sehr unangenehm	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*sehr angenehm*

3. Warum haben Sie die Arbeitstätigkeit (vorzeitig) beendet? (Mehrfachnennungen möglich)

- O Das Experiment wurde vom Experimentleiter beendet.
- O Die Tätigkeit war unangenehm.
- O Der Arbeitslohn war zu gering.
- O Ich hatte noch einen anderen Termin.
- O Ich hatte keine Lust mehr.
- O Sonstiges (bitte nennen):_____.

4. Haben Sie die Arbeitstätigkeit (zumindest eine Zeit lang) ausgeführt und was war der Grund warum Sie gearbeitet haben? (Mehrfachnennungen möglich)

- O Ich habe gar nicht gearbeitet.
- O Ich habe des Geldes wegen gearbeitet.
- O Ich fand die Tätigkeit angenehm und habe deswegen gearbeitet.
- O Ich fühlte mich als Experimentteilnehmer moralisch verpflichtet zu arbeiten.
- O Sonstiges (bitte nennen):_____.

5. Haben Sie <u>vor</u> Beginn der Arbeitstätigkeit Ihren Steuersatz ermittelt bzw. dieses versucht?

- O Ja.
- O Nein.

6. Nennen Sie uns bitte den für Sie geltenden effektiven (Gesamt-)Steuersatz jetzt noch einmal, bzw. versuchen Sie diesen bitte jetzt zu berechnen, wenn Sie dies noch nicht während des Experiments getan haben.

Steuersatz (in Prozent):_____%.

7. Welchen Einfluss hatte die erhobene <u>Steuer</u> auf Ihre Arbeitsbereitschaft auf einer Skala von 1 = „gar keinen Einfluss“ bis 10 = „sehr großen Einfluss“.

gar keinen Einfluss	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*sehr großen Einfluss*

8. Haben Sie vor Beginn des Experiments Ihren <u>Nettolohn pro Bogen</u> ermittelt?

O Ja.

O Nein.

9. Nennen Sie uns bitte Ihren <u>Nettolohn pro Bogen</u> jetzt noch einmal, bzw. versuchen Sie diesen bitte jetzt zu berechnen, wenn Sie dies noch nicht während des Experiments getan haben.

Nettolohn:_____Euro pro Bogen.

10. Wie wichtig war für Sie die Höhe des <u>Nettolohns</u> bei der Entscheidung zu arbeiten auf einer Skala von 1 = „ganz unwichtig“ bis 10 = „sehr wichtig“.

ganz unwichtig	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*sehr wichtig*

11. Wie fair fanden Sie die Vergütung für die von Ihnen geforderte Tätigkeit auf einer Skala von 1 = „gar nicht fair“ bis 10 = „sehr fair“.

gar nicht fair	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*sehr fair*

12. Welchen NETTOlohn pro Stück würden Sie im Rahmen eines solchen Experiments mindestens fordern, damit Sie diese Tätigkeit überhaupt ausführen?

Ich würde mindestens _____ Cent pro Bogen verlangen.

13. Wie schätzen Sie Ihre eigenen Steuerrechtskenntnisse auf einer Skala von 1 = „keine Kenntnisse“ bis 10 = „überdurchschnittliche Kenntnisse“ ein?

Keine Kenntnisse	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*Überdurchschnittliche Kenntnisse*

14. Wie würden Sie auf einer Skala von 1 bis 10 Ihre persönliche Risikoeinstellung einschätzen, wobei 1 soviel wie „Ich sehe das Risiko eher als eine Gefahr und versuche jedes Risiko zu vermeiden (risikoscheu)“ und 10 soviel wie „Ich sehe das Risiko eher als Chance und gehe gern Risiken ein (risikofreudig)“ bedeutet?

risikoscheu	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*risikofreudig*

15. Bitte stellen Sie sich folgende Situation vor: Sie können an einer Lotterie teilnehmen und haben dabei die Wahl zwischen zwei Varianten, die unterschiedliche Gewinne versprechen.

Lotterie A: Mit einer Wahrscheinlichkeit von 60% gewinnen Sie 3.000 € und mit einer Wahrscheinlichkeit von 40% gewinnen Sie 500 €.

Lotterie B: Mit einer Wahrscheinlichkeit von **X**% gewinnen Sie 5.000 €, andernfalls gewinnen Sie ebenfalls 500 €.

Wie hoch sollte **X** für Sie persönlich sein, damit Sie beide Lotterien gleich gut finden? Achtung: Es geht hier ausschließlich um Ihre persönliche Neigung, es gibt keine richtige oder falsche Antwort.

X sollte _____% betragen.

16. Wie würden Sie auf einer Skala von 1 bis 10 Ihre persönlichen Kenntnisse und Erfahrungen bei der Investition in Finanzanlagen (z. B. Wertpapiere, Anleihen, Festgeldkonten etc.) beurteilen, wobei 1 „gar keine Erfahrung“ und 10 „sehr viel Erfahrung“ bedeutet?

gar keine Erfahrung	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	*sehr viel Erfahrung*

17. In welche Finanzanlageprodukte haben Sie jemals investiert? (Mehrfachnennungen möglich)

- O Aktien
- O Aktienfonds
- O Zertifikate (z. B. Indexzertifikate)
- O Unternehmensanleihen
- O Optionsscheine
- O Festgeld, Tagesgeld, Bundesschatzbriefe
- O sonstige:_____.

18. Was ist Ihr höchster Schulabschluss?

- O Hochschul- oder Fachhochschulabschluss
- O Abitur
- O Realschule
- O Hauptschule
- O kein Abschluss

19. Wenn Sie gerade studieren, nennen Sie uns bitte Ihren Studiengang sowie ihr aktuelles Fachsemester:

- Studiengang:_____.
- Fachsemester:_____.

20. Haben Sie in Ihrem Studium bereits Veranstaltungen im <u>Vertiefungsgebiet</u> „Steuerlehre“ besucht?

- O Ja.
- O Nein.

21. Geschlecht:

- O männlich
- O weiblich

22. Alter:

_____ Jahre

23. Haben Sie Kinder?

- O Ja.
- O Nein.

24. Ihr Familienstand?

- O Verheiratet
- O Ledig
- O Geschieden/Verwitwet
- O Sonstiges (z. B. Lebenspartnerschaften)

25. Wie hoch ist ungefähr Ihr monatliches zur Verfügung stehendes Einkommen?

- O < 500 €
- O 501 € – 1.000 €
- O 1.001 € – 1.500 €
- O 1.501 € – 2.000 €
- O > 2.000 €

26. Wer hat Ihre letzte Einkommensteuererklärung erstellt?

- o Sie selbst
- o Ein Familienangehöriger
- o Ein Freund bzw. Bekannter
- o Ein Steuerberater
- o keine abgegeben

Fragebogen Experiment Teil 2

27. Tragen Sie hier bitte Ihre Teilnehmernummer ein:

_____

28. Wie lange haben Sie über Ihre Investitionsentscheidung nachgedacht, bevor Sie diese endgültig getroffen haben?

Ich habe ca. _____ Minuten über meine Entscheidung nachgedacht.

29. Hätten Sie sich bei einem Investitionsbetrag von 5.000 € für die gleiche Anlagestrategie entschieden?

- o Ja.
- o Nein, ich hätte die 5.000 € wie folgt aufgeteilt:

  Investitionsbetrag A: _____

  Investitionsbetrag B: _____

  Nicht investiert: _____

30. Was war ausschlaggebend für Ihre Investitionsentscheidung (Mehrfachnennungen sind möglich)?

- o Ich habe die Entscheidung rein zufällig getroffen.
- o Das Risiko der einzelnen Anlagen war entscheidend.
- o Die durchschnittliche Rendite der Anlagen war entscheidend.
- o Die Gefahr eines Verlustes war entscheidend.
- o Der maximale Gewinn war entscheidend.
- o sonstiges:_____.

Anleitung

Mit der Teilnahme an diesem Experiment haben Sie die Möglichkeit, Geld zu verdienen. Die Höhe des Verdienstes am Ende des Experiments richtet sich nach ihrer persönlichen Anstrengung. Bitte lesen Sie diese Anleitung aufmerksam durch. Bei Fragen wenden Sie sich bitte an die Experimentleitung.

Das Ziel dieses Experiments ist es, Informationen über Ihr persönliches Arbeitsangebot zu erhalten. Zu diesem Zweck werden Sie mit einer realen Arbeitssituation konfrontiert, bei welcher Sie Geld verdienen können. Zur Vergleichbarkeit der Daten verschiedener Teilnehmer handelt es sich bei der Arbeitsaufgabe um eine Tätigkeit, welche keine Vorkenntnisse oder speziellen Fähigkeiten erfordert.

Wir möchten Sie darauf hinweisen, dass Gespräche mit anderen Teilnehmern, das Verlassen des Platzes sowie die Nutzung des PCs für private Zwecke während der Durchführung des Experiments nicht erlaubt sind. Nachdem Sie diese Anleitung gelesen haben, erhalten Sie mehrere Lösungsbögen einer Klausur, welche zu digitalisieren sind. Dazu finden Sie auf Ihrem Rechner eine vorgefertigte Exceldatei, in welche die Lösungsbögen zu übernehmen sind. Wie das Digitalisierungsverfahren konkret durchgeführt werden soll, wird Ihnen nach dem Lesen dieser Anleitung exemplarisch vom Experimentleiter vorgeführt.

Abhängig von der Anzahl der fehlerfrei digitalisierten Bögen erhalten Sie am Ende des Experiments ihre Gehaltszahlung. Für jeden digitalisierten Bogen erhalten Sie einen ***Bruttolohn in Höhe von 30 Cent.*** *Wenn Sie also beispielsweise durchschnittlich einen Bogen pro Minute digitalisieren, erhalten Sie ein Gehalt von 18 Euro brutto pro Stunde; bei durchschnittlich 1,5 Bögen pro Minute erhalten Sie ein Gehalt von 27 Euro brutto pro* Stunde. **Bitte beachten Sie: Von Ihrem Bruttolohn müssen Sie noch Steuerzahlungen leisten, nur der Rest (Nettolohn) wird Ihnen am Ende des Experiments bar ausgezahlt. Die Höhe der zu zahlenden Steuer bzw. den entsprechenden Steuersatz entnehmen Sie bitte der Steuersystemkarte, welche Ihnen noch separat ausgehändigt wird. Lesen Sie auch diese bitte vor Beginn der Tätigkeit sorgfältig durch!**

Sie entscheiden selbst über Ihr Arbeitsangebot! Das bedeutet, dass Sie so lange und soviel arbeiten können wie Sie wollen. Sie können das Experiment also jederzeit beenden und erhalten im Anschluss daran Ihre Gehaltsauszahlung in Abhängigkeit von Ihrer erbrachten Arbeitsleistung. Bitte melden Sie sich beim Experimentleiter, wenn Sie das Experiment beenden wollen.

Viel Vergnügen!

Anleitung Investitionsentscheidung (B/S)

Willkommen zum zweiten Teil des Experimentes. Hier haben Sie die Möglichkeit, dass zuvor verdiente Geld zu investieren. Die Höhe des Verdienstes am Ende des Experiments richtet sich nach ihrer persönlichen Investitionsentscheidung. Bitte lesen Sie diese Anleitung aufmerksam durch. Bei Fragen wenden Sie sich bitte an die Experimentleitung.

Das Ziel dieses Experiments ist es, Informationen über Ihr persönliches Investitionsverhalten und Ihre Risikobereitschaft zu erhalten. Zu diesem Zweck haben Sie jetzt die Möglichkeit, dass von Ihnen erarbeitete Geld auf verschiedene Anlagen zu verteilen. Zur Investition steht Ihnen der auf Ihrem Auszahlungsbeleg angegebene Bruttolohn zur Verfügung. Bedenken Sie, dass Sie am Ende des Experiments auf die erzielten Zinsen aus der Investition wie auch auf den investierten Betrag selbst noch Steuern zahlen müssen. **Der Steuersatz beträgt wie im ersten Teil des Experimentes 60%.** Sollte Ihnen keine der möglichen Anlagen zusagen, brauchen Sie Ihr Geld gar nicht zu investieren und erhalten dementsprechend auch keine Zinszahlungen.

Sie können den ausgewiesenen Betrag beliebig auf die folgenden Anlagen verteilen, welche sich hinsichtlich ihrer Risikostruktur unterscheiden (siehe beigefügter Grafik). Welcher der jeweiligen Zustände im Anschluss an ihre Entscheidung eintrifft, wird bei Auszahlung der Rendite mit Hilfe eines Würfels bestimmt. Dabei wird der Zustand für jede der beiden Anlagen separat ausgewürfelt!

- **Anlage A:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite vor Steuern:	+60%	+30%	+0%

- **Anlage B:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite vor Steuern:	+90%	+30%	-30%

Nachdem Sie Ihre Wahl (die Verteilung ihres Bruttolohns auf Anlage A und Anlage B getroffen haben, tragen Sie diese Verteilung bitte auf den ausgeteilten Entscheidungszettel ein und übergeben Sie diesen dem Experimentleiter.

Mit der Auszahlung ist das Experiment beendet.

Vielen Dank für Ihre Teilnahme!

Anleitung Investitionsentscheidung (B/SF)

Willkommen zum zweiten Teil des Experimentes. Hier haben Sie die Möglichkeit, dass zuvor verdiente Geld zu investieren. Die Höhe des Verdienstes am Ende des Experiments richtet sich nach ihrer persönlichen Investitionsentscheidung. Bitte lesen Sie diese Anleitung aufmerksam durch. Bei Fragen wenden Sie sich bitte an die Experimentleitung.

Das Ziel dieses Experiments ist es, Informationen über Ihr persönliches Investitionsverhalten und Ihre Risikobereitschaft zu erhalten. Zu diesem Zweck haben Sie jetzt die Möglichkeit, dass von Ihnen erarbeitete Geld auf verschiedene Anlagen zu verteilen. Zur Investition steht Ihnen der auf Ihrem Auszahlungsbeleg angegebene Bruttolohn zur Verfügung. Bedenken Sie, dass Sie am Ende des Experiments noch Steuern auf den investierten Betrag zahlen müssen. **Der Steuersatz beträgt 60%**. Die Zinsen selbst sind steuerfrei. Sollte Ihnen keine der möglichen Anlagen zusagen, brauchen Sie Ihr Geld gar nicht zu investieren und erhalten dementsprechend auch keine Zinszahlungen.

Sie können den ausgewiesenen Betrag beliebig auf die folgenden Anlagen verteilen, welche sich hinsichtlich ihrer Risikostruktur unterscheiden (siehe beigefügter Grafik). Welcher der jeweiligen Zustände im Anschluss an ihre Entscheidung eintrifft, wird bei Auszahlung der Rendite mit Hilfe eines Würfels bestimmt.

- **Anlage A:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite:	+60%	+30%	+0%

- **Anlage B:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite:	+90%	+30%	-30%

Nachdem Sie Ihre Wahl (die Verteilung ihres Bruttolohns auf Anlage A und Anlage B getroffen haben, tragen Sie diese Verteilung bitte auf den ausgeteilten Entscheidungszettel ein und übergeben Sie diesen dem Experimentleiter.

Mit der Auszahlung ist das Experiment beendet.

Vielen Dank für Ihre Teilnahme!

Anleitung Investitionsentscheidung (N/S)

Willkommen zum zweiten Teil des Experimentes. Hier haben Sie die Möglichkeit, dass zuvor verdiente Geld zu investieren. Die Höhe des Verdienstes am Ende des Experiments richtet sich nach ihrer persönlichen Investitionsentscheidung. Bitte lesen Sie diese Anleitung aufmerksam durch. Bei Fragen wenden Sie sich bitte an die Experimentleitung.

Das Ziel dieses Experiments ist es, Informationen über Ihr persönliches Investitionsverhalten und Ihre Risikobereitschaft zu erhalten. Zu diesem Zweck haben Sie jetzt die Möglichkeit, dass von Ihnen erarbeitete Geld auf verschiedene Anlagen zu verteilen. Zur Investition steht Ihnen der auf Ihrem Auszahlungsbeleg angegebene Nettolohn zur Verfügung. Bedenken Sie, dass Sie am Ende des Experiments auf die erzielten Zinsen aus der Investition noch Steuern zahlen müssen. **Der Steuersatz beträgt wie auch im ersten Teil des Experimentes 60%.** Sollte Ihnen keine der

möglichen Anlagen zusagen, brauchen Sie Ihr Geld gar nicht zu investieren und erhalten dementsprechend auch keine Zinszahlungen.

Sie können den ausgewiesenen Betrag beliebig auf die folgenden Anlagen verteilen, welche sich hinsichtlich ihrer Risikostruktur unterscheiden (siehe beigefügter Grafik). Welcher der jeweiligen Zustände im Anschluss an ihre Entscheidung eintrifft, wird bei Auszahlung der Rendite mit Hilfe eines Würfels bestimmt.

- **Anlage A:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite vor Steuern:	+60%	+30%	+0%

- **Anlage B:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite vor Steuern:	+90%	+30%	-30%

Nachdem Sie Ihre Wahl (die Verteilung ihres Nettolohns auf Anlage A und Anlage B getroffen haben, tragen Sie diese Verteilung bitte auf den ausgeteilten Entscheidungszettel ein und übergeben Sie diesen dem Experimentleiter.

Mit der Auszahlung ist das Experiment beendet.

Vielen Dank für Ihre Teilnahme!

Anleitung Investitionsentscheidung (N/SF)

Willkommen zum zweiten Teil des Experimentes. Hier haben Sie die Möglichkeit, dass zuvor verdiente Geld zu investieren. Die Höhe des Verdienstes am Ende des Experiments richtet sich nach

ihrer persönlichen Investitionsentscheidung. Bitte lesen Sie diese Anleitung aufmerksam durch. Bei Fragen wenden Sie sich bitte an die Experimentleitung.

Das Ziel dieses Experiments ist es, Informationen über Ihr persönliches Investitionsverhalten und Ihre Risikobereitschaft zu erhalten. Zu diesem Zweck haben Sie jetzt die Möglichkeit, dass von Ihnen erarbeitete Geld auf verschiedene Anlagen zu verteilen. Zur Investition steht Ihnen der auf Ihrem Auszahlungsbeleg angegebene Nettolohn zur Verfügung. Die erzielten Zinsen sind steuerfrei. Sollte Ihnen keine der möglichen Anlagen zusagen, brauchen Sie Ihr Geld gar nicht zu investieren und erhalten dementsprechend auch keine Zinszahlungen.

Sie können den ausgewiesenen Betrag beliebig auf die folgenden Anlagen verteilen, welche sich hinsichtlich ihrer Risikostruktur unterscheiden (siehe beigefügter Grafik). Welcher der jeweiligen Zustände im Anschluss an ihre Entscheidung eintrifft, wird bei Auszahlung der Rendite mit Hilfe eines Würfels bestimmt.

- **Anlage A:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite:	+60%	+30%	+0%

- **Anlage B:**

	Zustand 1	Zustand 2	Zustand 3
Eintrittswahrscheinlichkeit:	1/3	1/3	1/3
Rendite:	+90%	+30%	-30%

Nachdem Sie Ihre Wahl (die Verteilung ihres Nettolohns auf Anlage A und Anlage B getroffen haben, tragen Sie diese Verteilung bitte auf den ausgeteilten Entscheidungszettel ein und übergeben Sie diesen dem Experimentleiter.

Mit der Auszahlung ist das Experiment beendet.

Vielen Dank für Ihre Teilnahme!

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