Social Sciences and Humanities Research Council of Canada

Conseil de recherches en sciences humaines du Canada

Application for a Grant

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Identification

This page will be made available to selection committee members and external assessors.

Funding opportunity	Funding Stream
Insight Grants	B ($100,001 to $400,000)

Joint or special initiative

Application title

Improving the measurement of consumption and income dynamics

Applicant family name	Applicant given name	Initials
Hryshko	Dmytro	

Org. code	Full name of applicant's organization and department
1480111	University of Alberta Economics

Org. code	Full name of administrative organization and department
1480111	University of Alberta Economics

Preferred Adjudication Committee: 435-07

Does your proposal involve Aboriginal Research as defined by SSHRC?	Yes ○	No ◉
Does your proposal involve human beings as research subjects? If "Yes", consult the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* and submit your proposal to your organization's Research Ethics Board.	Yes ○	No ◉
Does any phase of the proposed research or research-related activity:		
A. Constitute a physical activity carried out on federal lands in Canada, as defined in sub-section 2(1), in relation to a physical work and that is not a designated project;	Yes ○	No ◉
B. Constitute a physical activity carried out outside of Canada in relation to a physical work and that is not a designated project;	Yes ○	No ◉
C. (i) Permit a designated project (listed in the CEAA 2012 Regulations Designating Physical Activities (RDPA)) to be carried out in whole or in part;	Yes ○	No ◉
C. (ii) Depend on a designated project (listed in the RDPA) that is, or will be, carried out by a third party?	Yes ○	No ◉

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Total funds requested from SSHRC	33,775	24,917	27,954	26,008	0	112,654

Participants

List names of your team members (co-applicants and collaborators) who will take part in the intellectual direction of the research. Do not include assistants, students or consultants.

Role
Co-applicant ○ Collaborator ◉

Family name	Given name	Initials
Manovskii	Iourii	

Org. code	Full organization name
9933102	University of Pennsylvania

Department/Division name
Economics

Role
Co-applicant ○ Collaborator ○

Family name	Given name	Initials

Org. code	Full organization name

Department/Division name

Role
Co-applicant ○ Collaborator ○

Family name	Given name	Initials

Org. code	Full organization name

Department/Division name

Role
Co-applicant ○ Collaborator ○

Family name	Given name	Initials

Org. code	Full organization name

Department/Division name

Role
Co-applicant ○ Collaborator ○

Family name	Given name	Initials

Org. code	Full organization name

Department/Division name

Family name, Given name
Hryshko, Dmytro

Research Activity

The information provided in this section refers to your research proposal.

Keywords

List keywords that best describe your proposed research or research activity. Separate keywords with a semicolon.

consumption insurance; inequality; life cycle models; quantitative macroeconomics; measurement; survey design; estimation; rare shocks; minimum distance; indirect inference

Disciplines

- Indicate and rank up to 3 disciplines that best correspond to your activity.

Rank	Code	Discipline	If "Other", specify
1	61000	Economics	
2	63400	Sociology	
3	60800	Demography	

Areas of Research

Indicate and rank up to 3 areas of research related to your proposal.

Rank	Code	Area
1	200	Family
2	160	Employment and labour
3		

Temporal Periods

If applicable, indicate up to 2 historical periods covered by your proposal.

From			To		
Year	BC	AD	Year	BC	AD
_____	◯	◯	_____	◯	◯
_____	◯	◯	_____	◯	◯

Personal information will be stored in the Personal Information Bank for the appropriate program.

Application WEB

PROTECTED B WHEN COMPLETED

Canada

Family name, Given name
Hryshko, Dmytro

Research Activity (cont'd)

Geographical Regions

If applicable, indicate and rank up to 3 geographical regions covered by or related to your proposal. Duplicate entries are not permitted.

Rank	Code	Region
1	1000	North America
2	3000	Europe
3	3100	Scandinavia

Countries

If applicable, indicate and rank up to 5 countries covered by or related to your proposal. Duplicate entries are not permitted.

Rank	Code	Country	Prov./ State
1	1200	UNITED STATES	
2	1100	CANADA	
3	3206	GERMANY	
4	3225	UNITED KINGDOM	
5	3101	DENMARK	

Family name, Given name

Hryshko, Dmytro

Response to Previous Critiques - maximum one page

Applicants may, if they wish, address criticisms and suggestions offered by adjudication committees and external assessors who have reviewed previous applications.

This a new application, and so no previous critiques are available.

Family name, Given name
Hryshko, Dmytro

Summary of Proposal

The summary of your research proposal should indicate clearly the problem or issue to be addressed, the potential contribution of the research both in terms of the advancement of knowledge and of the wider social benefit, etc.

Consumption is the largest component of any economy's aggregate demand and, arguably, one of the best metrics of individual and household well-being. Economists typically think that households dislike fluctuations in consumption, that is, households choose to smooth consumption insuring it against various shocks to their budgets such as disability or unemployment of their members. Measuring the extent of consumption insurance that households are able to achieve is key for assessing viability of the current public finance programs, and necessity for their improvement.

The current state-of-the-art measure of consumption insurance is constructed using longitudinal survey data with missing information on consumption and income, and imputed consumption, and may be plagued with biases in need of correction. The proposed research program consists of three projects focusing on improving the measurement of consumption insurance and income dynamics.

The first project will build on my recent work with my collaborator, Iourii Manovskii, where we found using administrative data from Germany and survey data from the U.S. that earnings observations around missing records are systematically different, lower and more volatile than the other individual earnings records, and that neglecting this property of earnings results in inflated estimates of consumption insurance. This project will study how missing income values themselves and their imputation, commonly done in estimation and various publicly available surveys, affect--- theoretically and empirically---the measurement of consumption insurance and income risk. This project will use survey and administrative data from the U.S. and Germany, and simulated data from a life cycle model of consumption.

The second project will build on my other recent work with Iourii Manovskii based on survey data from the Panel Study of Income Dynamics (PSID), the world's longest-running longitudinal survey originated in 1968 in the U.S. We found that families formed by sons of the original families surveyed in 1968 are drastically different from families formed by daughters of the original families in the dynamics of consumption and income. Those results are puzzling but also very important because the research based on the PSID is not only the foundation of our knowledge on consumption but also the foundation of knowledge in many other areas of social sciences. This project will evaluate the biases in the measured consumption insurance due to differences in the measured income and consumption dynamics resulting from who responds to the survey questions, the husband or the wife in households formed by married couples. This project will use data from the PSID and a variety of other surveys structured similarly to the PSID; I also plan to inquire about merging PSID data with administrative U.S. data.

The third project will assess the biases in the measured consumption insurance arising from a commonly used method of imputing household consumption by taking the difference between income and the change in wealth in adjacent years. This project will use administrative and survey data from Denmark and survey data from the Canadian Survey of Family Expenditures.

The findings of this research program will be useful for policymakers designing public policies aimed at consumption smoothing, survey developers, applied economists and researchers in a variety of social disciplines interested in the effects of consumption and income imputation, and the effects of the respondent's gender on the measurement of income and consumption dynamics.

Detailed Description

Objectives

Consumption is the largest component of any economy's aggregate demand accounting for at least 60% of GDP in developed economies. Understanding fluctuations in household consumption is therefore of an utmost importance for understanding business cycles. In economics, it is standard to think of households as being averse to fluctuations in consumption; that is, households, in pursuit of the highest possible consumption and the standard of living, will choose to smooth their consumption, or insure it against various shocks to household budgets such as disability and layoffs of their members. Measuring the extent of consumption insurance that households are able to achieve allows to assess viability of the extant public insurance system, and necessity for its improvement. The key component to measurement of consumption insurance is measurement of income shocks, or modeling the dynamics of individual and household incomes. The proposed research program will make a contribution towards measurement of consumption at the household level and income dynamics at household and individual levels using survey and administrative data. The current state-of-the-art measures of consumption insurance are based on longitudinal survey data with missing observations on income and/or consumption, and utilize imputed consumption. Although missing data are pervasive in survey data, little is known—theoretically and empirically—what effects missing data on income can impose on the measured consumption insurance. The first project will answer this question. The second project will follow up on my findings in Hryshko and Manovskii (2016) that households formed by daughters and sons of the original households of the Panel Study of Income Dynamics (PSID) are drastically different in consumption and income dynamics. It will study if measured consumption insurance and income persistence depend on who answers survey questionnaires about individual and family variables, males or females in the household. The third project will focus on the effect of a commonly used consumption imputation procedure on consumption dynamics and consumption insurance. Neither of these topics have been thoroughly studied in the literature, yet their importance is hard to overstate given the importance of a proper measurement of consumption insurance for evaluating various public policies targeted towards consumption smoothing.

Common Context

Theory Early theories of household consumption allowed for two contrasting environments with respect to insurance possibilities. On the one hand, in the footsteps of Arrow (1964) and Debreu (1959), early literature allowed for a wide array of assets (complete set of state-contingent assets) enabling the model households to fully insure idiosyncratic shocks to their budgets, both longer-lasting (e.g., disability) and of shorter duration (e.g., unemployment). This prediction of the complete markets model was tested and typically rejected in numerous papers such as Cochrane (1991), Hayashi, Altonji, and Kotlikoff (1996), Townsend (1994), Altug and Miller (1990), Mace (1991), and Hryshko, Luengo-Prado, and Sørensen (2010). On the other hand, another strand of the literature on household consumption, inspired by Friedman (1957), allowed for perfect credit markets, and a riskfree asset as a means of both insurance and asset accumulation (Hall (1978) is the first formalization of Friedman's ideas; the model setup with quadratic preferences, perfect credit markets, and a riskfree asset was further dubbed in the literature as the Permanent Income Hypothesis (PIH)—see, e.g., Deaton (1992), Meghir (2004), and Browning and Lusardi (1996) for extensive reviews).

The PIH predicts no insurance against permanent shocks to household budgets (due to, e.g., long-term disability of the household head) and nearly perfect insurance of transitory shocks (due to, e.g., loss of work due to a recoverable sickness). This prediction of the PIH was tested using micro data, e.g., in Hall and Mishkin (1982) and more recently in Pistaferri (2001) and Jappelli and Pistaferri (2006). Contrary to the predictions of the PIH, households in the data are found to have some insurance of permanent income shocks but are found to be excessively sensitive to transitory shocks. A generalization of the PIH that allowed for more realistic preferences and income process, prudence and impatience—the so-called buffer stock model of saving due to Deaton (1991), Carroll (1992) and Carroll (1997)—was able to deliver some

insurance of permanent shocks in a life-cycle setting (e.g., Carroll (2009)). Variants of this model are also sometimes labelled as the standard incomplete markets model as they limit the set of assets available for consumption insurance (a thorough review is provided in Heathcote, Storesletten, and Violante (2009)).[1]

The state-of-the-art measure of consumption insurance Recently, an influential contribution of Blundell, Pistaferri, and Preston (2008) developed a novel methodology for measuring consumption insurance in the data that enabled testing various theories. The objects of interest are the transmission coefficients to household consumption of permanent and transitory shocks to household budgets measured respectively by $\phi^{\text{true}} = \frac{\text{cov}(\Delta c_{it}, \xi_{it})}{\text{var}(\xi_{it})}$ and $\psi^{\text{true}} = \frac{\text{cov}(\Delta c_{it}, \epsilon_{it})}{\text{var}(\epsilon_{it})}$, where Δc_{it} is consumption growth of household i at time t, ξ_{it} is the permanent shock and ϵ_{it} is the transitory shock to some measure of household resources (e.g., male earnings or net family income). Since permanent and transitory shocks are not readily observed, Blundell, Pistaferri, and Preston (2008) suggested to use the following moments, that are easy to measure in the data, to identify the transmission coefficients when the permanent component is a random walk and the transitory shock has no persistence:[2]

$$\phi = \frac{E\left[\Delta c_{it} \sum_{j=-1}^{1} \Delta y_{it+j}\right]}{E\left[\Delta y_{it} \sum_{j=-1}^{1} \Delta y_{it+j}\right]} \qquad \psi = \frac{E\left[\Delta c_{it} y_{it+1}\right]}{E\left[\Delta y_{it} \Delta y_{it+1}\right]}, \tag{1}$$

where Δy_{it} is household i's income growth at time t, and $E[\cdot]$ is the expectations operator.

Blundell, Pistaferri, and Preston (2008) found, using U.S. survey data from the Panel Study of Income Dynamics (PSID), that household consumption is substantially insured against permanent shocks and nearly insensitive to transitory shocks to net family income ($\hat{\phi} \approx 0.64$ and $\hat{\psi} \approx 0.05$). A number of papers followed evaluating this result in the context of the standard incomplete markets model with a common finding that consumption in the data is excessively insured against permanent income shocks relative to the model's prediction (e.g., Kaplan and Violante (2010), Hryshko (2014), Guvenen and Smith (2014)).

Context and methodology I: Missing incomes, imputation, and the measurement of consumption insurance

To measure consumption insurance, economists rely on longitudinal survey data as administrative agencies do not collect data on household consumption. In empirical economics, it is common to use unbalanced panel data on household consumption and income—such data contain missing observations on income and/or consumption, and were also used by Blundell, Pistaferri, and Preston (2008) and Guvenen and Smith (2014). Little is known how missing income values and their imputation affect the estimated values of ϕ and ψ in Eq. (1) relative to their true values ϕ^{true} and ψ^{true}. This is the question the first project will attempt to answer.

In a recent paper Daly, Hryshko, and Manovskii (2016) showed, using survey data on earnings from the PSID and administrative data on earnings from Denmark and Germany, that earnings observations *around* missing records do not appear as the typical draws from individual earnings spells—they are lower on average and substantially more volatile. This can be due to tenure effects on wages and incomplete working years. We showed theoretically that failing to account for such effects while measuring consumption insurance using the methodology of Blundell, Pistaferri, and Preston (2008) will lead to a substantial overestimation of insurance against permanent shocks, and an erroneous conclusion of the failure of the standard incomplete markets model. Besides, the variance of permanent shocks will be overestimated using

[1] Because of its failure, the complete markets model was also generalized to a class of models that endogenously limit the set of tradable assets due to limited enforceability of contracts (e.g., Krueger and Perri (2006)) or private information on household resources (e.g., Attanasio and Pavoni (2011)). This class of models does not appear to fit the data better than the standard incomplete markets model (Broer (2013) and Broer, Kapička, and Klein (2017)).

[2] It is straightforward to generalize identification of ϕ to income processes with an MA(q) transitory component and/or an AR(1) permanent component (see, e.g., Kaplan and Violante (2010) for the latter).

the moments of Blundell, Pistaferri, and Preston (2008). Daly, Hryshko, and Manovskii (2016), however, did not explore how the nature of the missing records themselves may affect estimation of the income risk and consumption insurance against this risk. The first part of the proposed research agenda will attempt to tackle this question.

Blundell, Pistaferri, and Preston (2008) assumed an exogenous income process but did not impose any structure on how consumption is decided by the households in the data; their estimation is of the generalized method of moments type applied to panel data (Blundell (2017) calls this approach "semi" or "quasi" structural for this reason). Recent papers, however, attempted to jointly estimate consumption insurance and the size of income risk utilizing the standard incomplete markets model in a fully structural setting (a quantitative life-cycle model of consumption); e.g., Guvenen and Smith (2014) and Hryshko (2007). The basic idea behind such an estimation is that, in theory, consumption data are informative about identification of the income process parameters (see, e.g., Campbell (1987), Blundell and Preston (1998), and also Kaufmann and Pistaferri (2009) for a recent application).[3] Since structural estimation requires simulation of model data to be matched to the observed data, the researcher utilizing this method has to make a stand on the data generating process for missing income values.

Applied economists pay relatively little attention to missing observations frequently assuming that they are missing at random (Cameron and Trivedi (2005) provides an introduction to treatment of missing values; see, e.g., Altonji, Smith, and Vidangos (2013) and Guvenen and Smith (2014) for applications in the context of indirect inference). Many datasets used in social sciences such as the PSID and Current Population Survey (CPS) in the U.S. and Survey of Labour and Income Dynamics (SLID) in Canada impute missing observations on various variables guided by such considerations.[4] A natural question that arises is: Is this innocuous? In the context of structural estimation of household income risk and consumption insurance against this risk, Guvenen and Smith (2014), p. 2110, state that it is reasonable and innocuous to assume that missing values are missing at random since "*...a strength of the indirect inference method is that the particular filling-in method is not critical for the estimation as long as the same procedure is applied consistently to real and simulated data (as we do). As an extreme example, if we simply fill in all missing values with zeros, the estimates would still be consistent, as we show in the Monte Carlo analysis*."

My preliminary work suggests that this is not innocuous because incorrect specification of the data generating process for missing values will result in a misspecified structural model and biases in the estimated income process and consumption insurance. The following findings of Daly, Hryshko, and Manovskii (2016) will provide a motivating example. In the administrative data, there are no missing values on earnings unless an individual emigrates or dies, and missing values are created by applying to the data a typical to the literature filter of strong attachment to the labor force (e.g., Guvenen, Ozcan, and Song (2014), Meghir and Pistaferri (2004), Hryshko (2012)). When abnormally low (zero) earnings observations are dropped from the dataset, researchers, however, should be cognizant of the irregular nature of earnings observations around missing records as highlighted by Daly, Hryshko, and Manovskii (2016). This means that periods of (very) weak labor attachment are often surrounded by periods of low wages and/or hours. A similar pattern is observed in survey data on earnings from the PSID, the dataset used by Guvenen and Smith (2014) and many other researchers. The implications of these facts are, first, that missing earnings records are not random and, second, that earnings records around missing ones are, similarly, not random. Structural estimation should respect both of these facts but this hasn't been done in the literature up to this point. In other words, the two facts imply that there are some shocks, rare in nature, that result in a U-

[3]This estimation is technically more challenging than estimation in Blundell, Pistaferri, and Preston (2008). It is done by the method of simulated moments or indirect inference, and, depending on the complexity of the model structure, requires several days or weeks until convergence. Hryshko (2014) is an example of such work where I simulated a life-cycle model and used the model-simulated data to estimate consumption insurance relying on the methods of Blundell, Pistaferri, and Preston (2008) in the environment where permanent and transitory income shocks are correlated.

[4]Lillard, Smith, and Welch (1986) is an early warning of using imputed wage data from the CPS.

shaped path of earnings—periods of normal earnings are infrequently followed by temporary reductions in earnings and their subsequent, not immediate recovery. In the context of the above citation, it is not enough to do something about missing income records (for instance, assuming that they are zeros), as one has to also take a due care of the observations around them. Households might be aware of this U-shaped pattern of rare shocks and just replacing missing records with zeros (or any other reasonable values) in the real and model-simulated data might result in substantial biases in the measured insurance against permanent earnings shocks and the variance of permanent shocks. This is simply because the true structure of the economy with U-shaped rare shocks is different from a misspecified structure imposed on the data where such shocks are lacking.

My plan for the project is to simulate data from a quantitative life cycle model of consumption with realistic earnings risk featuring rare shocks that have a U-shaped pattern as described above and do not have it (say, temporary unemployment shocks that do not last for more than a period but wipe out earnings in the period they appear). I will then make various assumptions on the nature of missing records done in the literature and estimate the model-implied income process parameters and consumption insurance using the minimum-distance method of Eq. (1) and indirect inference. Some reasonable assumptions on the nature of missing income observations are that missing incomes correspond to random draws from part of the income distribution where an individual is typically observed in the data, individual averages observed in the data, zeros, or any draw from the age-dependent distribution of income.

Empirical part of the project will use the facts established in Daly, Hryshko, and Manovskii (2016); some extra empirical work on missing earnings records will be done using data from the PSID, and administrative data on earnings from Germany—both of the datasets are available to me. The project requires repeated calibrations and estimations of life-cycle models; this work can commence in the first year of the project.

Context and methodology II: Gender of the respondent to survey questionnaires, and measured consumption insurance and income dynamics

Hryshko and Manovskii (2016) using the data of Blundell, Pistaferri, and Preston (2008) found that there are two sets of households in the PSID which are drastically different in their income and consumption dynamics. The PSID was initiated in 1968 collecting data on incomes, food consumption, and demographics for a sample of about 3,000 households representative of the U.S.[5] The PSID distinguishes between so-called "sample" and "nonsample" individuals. The former group contains all original members (those who were part of the 1968 survey), and their offspring whereas the latter group contains individuals who enter the PSID due to marriages to the sample individuals and exit the PSID due to deaths or divorces. Using the language of the PSID, Hryshko and Manovskii (2016) found that the families headed by sample males are dramatically different from the families headed by nonsample males in the dynamics of consumption and income.[6] For convenience and by analogy with the PSID terminology, Hryshko and Manovskii (2016) call those families sample and nonsample families, respectively. Families formed by sons of the original PSID households have highly persistent incomes and virtually no consumption insurance against permanent income shocks whereas families formed by daughters of the original families have much less persistent incomes and substantially higher consumption insurance. Interestingly, the families formed by daughters and sons of the original PSID families are similar cross-sectionally along many dimensions such as average consumption, wealth, net income, age, risk aversion, etc.[7] Yet, they are different in terms of income

[5]The data also contained a sample of low-income households which are typically excluded from the analyses using PSID data, as was done in Blundell, Pistaferri, and Preston (2008).

[6]The PSID defines male as the head of household in married couples unless he is permanently disabled. I will further use this PSID convention of assigning male a role of the household head in married couples.

[7]Hryshko and Manovskii (2016) used methodology of Hryshko, Luengo-Prado, and Sørensen (2011) to calculate risk aversion of PSID individuals.

and consumption dynamics. Conditional on income dynamics, consumption insurance against permanent income shocks in both subsamples is consistent with the standard incomplete markets model unlike the well-known result in Blundell, Pistaferri, and Preston (2008) of excess insurance against permanent income shocks found for the whole sample.[8] Those results are puzzling but are highly robust. They are also very important because the research based on the PSID is not only the foundation of the economists' knowledge on consumption but also the foundation of knowledge in many areas of social sciences. The puzzling difference in income dynamics for the families of PSID sons and daughters remains to be explained, and this is one of the tasks I intend to undertake in this project.

One distinguishing characteristic of those families is that the wife in nonsample families is more likely to respond to the survey questions rather than the husband. If measurement error of female reports has a systematically different dynamics than measurement error of male reports, this could potentially explain our surprising findings. If measurement error is not the culprit behind the puzzling results, the search should proceed in a different direction. The best way to tackle this question is by merging administrative data on earnings for males and females to the survey records, and we plan to inquire about the possibility of such a merge for PSID data. Even if such a merge is not possible (as it requires agreement of the survey respondents),[9] we believe that much is to be learned by studying the relative dynamics of female versus male responses on income questions by resorting to an analysis of the datasets structured similarly to the PSID. Among those are the German Socio-Economic Panel (SOEP), the British Household Panel Survey (BHPS), and the Household, Income and Labour Dynamics in Australia (HILDA) survey.[10]

An interesting aspect of some of these datasets is that income information is gathered individually (e.g., in the BHPS), unlike in the PSID where one respondent, typically the head or his spouse, responds to all of the questions, inclusive of the questions on household and individual incomes. This implies that in the datasets where income reports are individual, the income dynamics of sample and nonsample households should be identical if the main reason for the difference in the observed income dynamics for sample and nonsample families in the PSID is gender of the individual reporting on incomes within a household.

The literature on how male versus female responses to income and/or consumption questions differ is scarce. Kreiner, Lassen, and Leth-Petersen (2015) using administrative and survey data for 2009 earnings of males and females in Denmark showed that females underreport, relative to men, their earnings. This evidence is cross-sectional and, ideally, one would need to know how reporting errors behave over time to say more about their effects on, say, consumption as theories of consumption address the behavior of consumption over time.[11] I find using data from the PSID that, conditional on a variety of characteristics and shocks, reported net family income grows (falls) when the survey respondent switches from the wife (husband) to the husband (wife). This evidence is about the dynamics of income and is potentially important—if frequency of respondents' switching within a family is sufficiently high it can create spurious variation in the estimated permanent and/or transitory component of income, affect the estimated trends in income inequality, and the estimates of consumption insurance and inequality.[12] This research project will aim at understanding the magnitude of such effects. The project requires dealing with publicly available datasets and can commence in the first year of the proposed grant. Part of the project will commence later, in years 2 or 3, if negotiations with the PSID about linking its data to administrative registers are successful.

[8] Blundell (2014) and Arellano, Blundell, and Bonhomme (2017) highlighted the importance of accounting for permanent income components that are less persistent than random walks.

[9] There are examples of merged publicly available survey data in the U.S. and administrative data, e.g., this was done for Health and Retirement Survey (HRS) data.

[10] These data are either publicly available or available at a low cost (HILDA).

[11] Bound, Brown, and Mathiowetz (2001) provide a summary of research on measurement error in survey data but, with a few exceptions, this research is also cross-sectional.

[12] The literature on income and consumption inequality is voluminous. Gottschalk and Moffitt (1994), Heathcote, Storesletten, and Violante (2010), Attanasio, Hurst, and Pistaferri (2012), Attanasio and Pistaferri (2016), and Hryshko, Juhn, and McKue (2017) are just a few studies to name.

Context and methodology III: Imputation of consumption and its effect on the measurement of consumption insurance

Panel data on household consumption that cover many years are hard to come by.[13] Because of this crucial limitation of virtually all available datasets, researchers resort to imputing consumption. One popular approach to imputing consumption data is to use administrative data on wealth and household disposable income, and an accounting identity that the sum of consumption and savings in any year should equal disposable income. Since households are not required to report savings to authorities, household savings are approximated by household wealth changes in adjacent years. The approach was pioneered by Browning and Leth-Petersen (2003) who used Danish registers to impute consumption and then related measurement error in consumption, obtained as the difference between imputed values and survey-reported values for the same households, to various demographic characteristics. Other recent papers analyzing the properties of imputed consumption based on wealth and income registers are Fagereng and Halvorsen (2017) and Eika, Mogstad, and Vestad (2017) using Norwegian registers, and Koijen, Van Nieuwerburgh, and Vestman (2015) and Kolsrud, Landais, and Spinnewijn (2017) using Swedish registers.

Because consumption is central to understanding well-being of the economy's members, and due to the sheer size of administrative registers, the literature utilizing imputed consumption is swiftly expanding. Browning, Gørtz, and Leth-Petersen (2013) study the effect of housing wealth on consumption in Denmark; Jensen and Johannesen (2017) study the effect of the recent financial crisis and the resulting reduction in credit supply on household consumption in Denmark while Leth-Petersen (2010) examines the effect of an expansion in credit supply due to an increase in house prices in Denmark; Fagereng, Holm, and Natvik (2016) study the effect of transitory income gains due to lottery winnings on consumption in Norway; De Giorgi, Frederiksen, and Pistaferri (2017) examine the effect of peers on individual consumption in Denmark. Neither these papers nor the methodological papers listed above study the dynamic properties of imputed consumption and the errors of imputation. Typically, imputed consumption data are considered to be a success if the average imputed consumption tracks well per capita consumption available from the national statistical agencies.

Attanasio, Borella, and Nielsen (2014) recently found, using the methodology of Blundell, Pistaferri, and Preston (2008) and imputed consumption data, that less than 50% of transitory shocks are insured in Denmark. This is at odds with a nearly full insurance of transitory shocks found for the U.S., given an arguably similar level of economic and financial development in the U.S. and Denmark. My preliminary results surprisingly show that consumption of the liquid wealth-rich households in Denmark is substantially sensitive to transitory income shocks. This runs against theoretical predictions and reasonable expectations. Clearly, more work is needed to understand the dynamic properties of imputed consumption. One unexploited avenue for this research that will be pursued in this project is an analysis of the business-cycle properties of the measurement error in imputed consumption. For this purpose, I will use the Canadian Survey of Family Expenditures. It is unique because it contains the data on both reported expenditures, and the change in household assets in adjacent years and current household income needed to calculate imputed consumption as is done by researchers relying on administrative registers. These data would allow for much bigger samples than in the literature—as compared to, e.g., Koijen, Van Nieuwerburgh, and Vestman (2015) and Kreiner, Lassen, and Leth-Petersen (2015)—to study the errors of imputation, and would enable exploring the properties of imputation at different stages of business cycle (which is yet to be done in the literature, to my current knowledge).

For this project, I plan to use Danish administrative registers, to which I have access from my collaboration with Danish colleagues at Copenhagen Business School, and survey data from Denmark and Canada. The project can commence in the first year of the proposed grant.

[13] The PSID started consistently collecting data on expenditure categories other than food only recently, in 1999. The recent data on expenditures are biennial, and cover only a subset of nondurable expenditures.

References

Altonji, J. G., A. A. Smith, and I. Vidangos (2013): "Modeling Earnings Dynamics," *Econometrica*, 81(4), 1395–1454.

Altug, S., and R. A. Miller (1990): "Household Choices in Equilibrium," *Econometrica*, 58(3), 543–570.

Arellano, M., R. Blundell, and S. Bonhomme (2017): "Earnings and Consumption Dynamics: A Nonlinear Panel Data Framework," *Econometrica, forthcoming*.

Arrow, K. J. (1964): "The Role of Securities in the Optimal Allocation of Risk Bearing," *Review of Economic Studies*, 31, 91–96.

Attanasio, O., E. Hurst, and L. Pistaferri (2012): "The Evolution of Income, Consumption, and Leisure Inequality in the US, 1980–2010," NBER Working Paper # 17982.

Attanasio, O., and L. Pistaferri (2016): "Consumption Inequality," *Journal of Economic Perspectives*, 30, 3–28.

Attanasio, O. P., M. Borella, and T. H. Nielsen (2014): "Characterizing Income Shocks and their Transmission to Household Consumption," in *Longer-term Consequences of the Great Recession on the Lives of Europeans*, ed. by A. Brugiavini, and G. Weber, chap. 3, pp. 114–160. Oxford University Press, Oxford.

Attanasio, O. P., and N. Pavoni (2011): "Risk Sharing in Private Information Models With Asset Accumulation: Explaining the Excess Smoothness of Consumption," *Econometrica*, 79(4), 1027–1068.

Blundell, R. (2014): "Income Dynamics and Life-Cycle Inequality: Mechanisms and Controversies," *Economic Journal*, 124, 289–318.

——— (2017): "What Have We Learned from Structural Models?," *American Economic Review: Papers and Proceedings*, 107, 287–292.

Blundell, R., L. Pistaferri, and I. Preston (2008): "Consumption Inequality and Partial Insurance," *American Economic Review*, 98(5), 1887–1921.

Blundell, R., and I. Preston (1998): "Consumption Inequality and Income Uncertainty," *Quarterly Journal of Economics*, 113, 603–640.

Bound, J., C. Brown, and N. Mathiowetz (2001): "Measurement Error in Survey Data," in *Handbook of Econometrics, Vol.5*, ed. by J. J. Heckman, and E. Leamer, chap. 59, pp. 3705–3843. North-Holland, New York.

Broer, T. (2013): "The Wrong Shape of Insurance? What Cross-Sectional Distributions Tell Us About Models of Consumption Smoothing," *American Economic Journal: Macroeconomics*, 5(4), 107–140.

Broer, T., M. Kapička, and P. Klein (2017): "Consumption risk sharing with private information and limited enforcement," *Review of Economic Dynamics*, 23, 170–190.

Browning, M., M. Gørtz, and S. Leth-Petersen (2013): "Housing Wealth and Consumption: A Micro Panel Study," *Economic Journal*, 123, 401–428.

Browning, M., and S. Leth-Petersen (2003): "Imputing Consumption from Income and Wealth Information," *Economic Journal*, 113, F282–F301.

Browning, M., and A. Lusardi (1996): "Household Saving: Micro Theories and Micro Facts," *Journal of Economic Literature*, 34(4), 1797–1855.

Cameron, C. A., and P. K. Trivedi (2005): *Microeconometrics: Methods and Applications*. Cambridge University Press, Cambridge, UK.

Campbell, J. Y. (1987): "Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis," *Econometrica*, 55(6), 1249–1273.

Carroll, C. D. (1992): "The Buffer-Stock Theory of Saving: Some Macroeconomic Evidence," *Brookings Papers on Economic Activity*, 2, 61–156.

——— (1997): "Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis," *Quarterly Journal of Economics*, 112, 1–55.

——— (2009): "Precautionary Saving and the Marginal Propensity to Consume Out of Permanent Income," *Journal of Monetary Economics*, 56, 780–790.

Cochrane, J. H. (1991): "A Simple Test of Consumption Insurance," *Journal of Political Economy*, 99(5), 957–976.

Daly, M., D. Hryshko, and I. Manovskii (2016): "Improving the Measurement of Earnings Dynamics," NBER Working Paper # 22938.

De Giorgi, G., A. Frederiksen, and L. Pistaferri (2017): "Consumption Network Effects," Mimeo, Stanford University.

Deaton, A. (1991): "Saving and Liquidity Constraints," *Econometrica*, 59, 1121–1248.

——— (1992): *Understanding Consumption*. Oxford University Press, New York, NY.

Debreu, G. (1959): *Theory of Value: An Axiomatic Analysis of Economic Equilibrium*. Cowles Foundation for Research in Economic, Yale University.

Eika, L., M. Mogstad, and O. L. Vestad (2017): "What can we learn about household consumption expenditure from data on income and assets?," Mimeo, University of Chicago.

Fagereng, A., and E. Halvorsen (2017): "Imputing consumption from Norwegian income and wealth registry data," *Journal of Economic and Social Measurement*, 42, 67–100.

Fagereng, A., M. B. Holm, and G. J. Natvik (2016): "MPC Heterogeneity and Household Balance Sheets," Statistics Norway DP No. 852.

Friedman, M. (1957): *A Theory of the Consumption Function*. Princeton University Press, Princeton, NJ.

Gottschalk, P., and R. A. Moffitt (1994): "The Growth of Earnings Instability in the U.S. Labor Market," *Brookings Papers on Economic Activity*, 2, 217–54.

Guvenen, F., S. Ozcan, and J. Song (2014): "The Nature of Countercyclical Income Risk," *Journal of Political Economy*, 122(3), 621–660.

Guvenen, F., and A. A. Smith (2014): "Inferring Labor Income Risk and Partial Insurance from Economic Choices," *Econometrica*, 82(6), 2085–2129.

HALL, R., AND F. MISHKIN (1982): "The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data of Households," *Econometrica*, 50, 461–481.

HALL, R. A. (1978): "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy*, 86(6), 971–987.

HAYASHI, F., J. ALTONJI, AND L. KOTLIKOFF (1996): "Risk-sharing between and within Families," *Econometrica*, 64(2), 261–294.

HEATHCOTE, J., K. STORESLETTEN, AND G. L. VIOLANTE (2009): "Quantitative Macroeconomics with Heterogeneous Households," *Annual Review of Economics*, 1, 319–354.

——— (2010): "The Macroeconomic Implications of Rising Wage Inequality in the United States," *Journal of Political Economy*, 118(4), 681–722.

HRYSHKO, D. (2007): "Excess Smoothness of Consumption in an Estimated Life Cycle Model," Mimeo, University of Alberta.

——— (2012): "Labor Income Profiles Are Not Heterogeneous: Evidence From Income Growth Rates," *Quantitative Economics*, 3, 177–209.

——— (2014): "Correlated Income Shocks and Excess Smoothness of Consumption," *Journal of Economic Dynamics and Control*, 48, 41–62.

HRYSHKO, D., C. JUHN, AND K. MCKUE (2017): "Trends in earnings inequality and earnings instability among U.S. couples: How important is assortative matching?," *Labour Economics*, 48, 168–182.

HRYSHKO, D., M. J. LUENGO-PRADO, AND B. E. SØRENSEN (2010): "House Prices and Risk Sharing," *Journal of Monetary Economics*, 57(8), 975–987.

HRYSHKO, D., M. J. LUENGO-PRADO, AND B. E. SØRENSEN (2011): "Childhood Determinants of Risk Aversion: The Long Shadow of Compulsory Education," *Quantitative Economics*, 2, 37–72.

HRYSHKO, D., AND I. MANOVSKII (2016): "How Much Consumption Insurance in the U.S.?," mimeo, University of Alberta and University of Pennsylvania.

JAPPELLI, T., AND L. PISTAFERRI (2006): "Intertemporal Choice and Consumption Mobility," *Journal of the European Economic Association*, 4, 75–115.

JENSEN, T. L., AND N. JOHANNESEN (2017): "The Consumption Effects of the 2007-2008 Financial Crisis: Evidence from Households in Denmark," *American Economic Review, forthcoming*.

KAPLAN, G., AND G. L. VIOLANTE (2010): "How Much Consumption Insurance Beyond Self-Insurance?," *American Economic Journal: Macroeconomics*, 2, 53–87.

KAUFMANN, K., AND L. PISTAFERRI (2009): "Disentangling Insurance and Information in Intertemporal Consumption Choices," *American Economic Review: Papers and Proceedings*, 99, 387–392.

KOIJEN, R., S. VAN NIEUWERBURGH, AND R. VESTMAN (2015): "Judging the Quality of Survey Data by Comparison with "Truth" as Measured by Administrative Records: Evidence From Sweden," in *Improving the Measurement of Consumer Expenditures*, ed. by C. D. Carroll, T. F. Crossley, and J. Sabelhaus, pp. 289–307. University of Chicago Press.

Kolsrud, J., C. Landais, and J. Spinnewijn (2017): "Registry Information and Consumption Patterns. Lessons From the Swedish Administrative Data," In progress, London School of Economics.

Kreiner, C. T., D. D. Lassen, and S. Leth-Petersen (2015): "Measuring the Accuracy of Survey Responses Using Administrative Register Data: Evidence from Denmark," in *Improving the Measurement of Consumer Expenditures*, ed. by C. D. Carroll, T. F. Crossley, and J. Sabelhaus, pp. 289–307. University of Chicago Press.

Krueger, D., and F. Perri (2006): "Does Income Inequality Lead to Consumption Inequality? Evidence and Theory," *Review of Economic Studies*, 73(1), 163–193.

Leth-Petersen, S. (2010): "Intertemporal Consumption and Credit Constraints: Does Total Expenditure Respond to an Exogenous Shock to Credit?," *American Economic Review*, 100, 1080–1103.

Lillard, L., J. P. Smith, and F. Welch (1986): "What Do We Really Know about Wages? The Importance of Nonreporting and Census Imputation," *Journal of Political Economy*, 94, 489–506.

Mace, B. J. (1991): "Full Insurance in the Presence of Aggregate Uncertainty," *Journal of Political Economy*, 99(5), 928–956.

Meghir, C. (2004): "A Retrospective on Friedman's Theory of Permanent Income," *Economic Journal*, 114, F293–F306.

Meghir, C., and L. Pistaferri (2004): "Income Variance Dynamics and Heterogeneity," *Econometrica*, 72(1), 1–32.

Pistaferri, L. (2001): "Superior Information, Income Shocks, and the Permanent Income Hypothesis," *Review of Economics and Statistics*, 83, 465–476.

Townsend, R. M. (1994): "Risk and Insurance in Village India," *Econometrica*, 62(3), 539–591.

Knowledge Mobilization Plan

The proposed research program will enhance our understanding of consumption dynamics at the household, and income dynamics at the individual and household levels. The results from three research projects outlined in the detailed description will be valuable not only for macroeconomists interested in consumption and applied economists interested in limitations of imputation and properties of measurement errors but also for researchers in other branches of social sciences as well as for the agencies designing longitudinal household surveys. The knowledge assembled through my research will be disseminated at conferences targeted to economists and social scientists, submitted to peer-review academic journals in economics, and taught to graduate students at the University of Alberta. Suitable outlets for the research program are general-interest (e.g., *Canadian Journal of Economics*, *Journal of the European Economic Association*, *Review of Economic Studies*, *Review of Economics and Statistics*, *International Economic Review*) and top-field journals in economics (e.g., *Review of Economic Dynamics*, *Journal of Applied Econometrics*, *Journal of Monetary Economics*, *Journal of Labor Economics*).

Seven of my papers, both published and in submission, have been invited for presentation at the National Bureau of Economic Research (NBER) Summer Institute, the Consumption group, the best conference in the economics of consumption. I have also presented at the best general interest conferences such as American Economic Association Meetings, or the World Congress of Econometric Society, and meetings of the Society of Economic Dynamics, the best conference in macroeconomics. Besides purely academic conferences for economists, I have also presented at a conference organized by the European Central Bank and at conferences organized by researchers at the Panel Study of Income Dynamics, the world's longest running household panel survey, that attracted social scientists from a variety of disciplines. Since my research has potential of a broad impact, I anticipate presentations at the above mentioned and other high-caliber conferences in economics and social sciences.

I also plan to integrate my findings into the courses Advanced Macroeconomic Theory II (ECON 582) taught to PhD students, and Advanced Macroeconomic Theory (ECON 482) taught to the honor's Bachelor students at the University of Alberta. Whenever possible, my data and programs generated from the research project will be made available to the general public (administrative data cannot be made publicly available); this is customarily done at the request of many peer-review journals in economics when manuscripts are accepted for publication.

Timeline:

Year 1: submit working papers to conferences and workshops, attend the NBER Summer Institute, Consumption group, and/or meetings of the Society for Economic Dynamics and teach macroeconomics courses. Attending the NBER Summer Institute is critical at an early stage of the project as it will allow for an informal discussion of ideas and results with the best economists in the discipline.
Year 2: submit working papers to peer-review journals, workshops and conferences, teach macroeconomics courses.
Year 3: submit working papers to peer-review journals, workshops and conferences, teach macroeconomics courses.
Year 4: submit working papers to peer-review journals, workshops and conferences, teach macroeconomics courses.

Family name, Given name
Hryshko, Dmytro

Expected Outcomes

Elaborate on the potential benefits and/or outcomes of your proposed research and/or related activities.

Scholarly Benefits

Indicate and rank up to 3 scholarly benefits relevant to your proposal.

Rank	Benefit	If "Other", specify
1	Enhanced research methods	
2	Knowledge creation/intellectual outcomes	
3	Student training/skill development	

Social Benefits

Indicate and rank up to 3 social benefits relevant to your proposal.

Rank	Benefit	If "Other", specify
1	Enhanced policy	
2	Enriched public discourse	
3	Training and skill development	

Audiences

Indicate and rank up to 5 potential target audiences relevant to your proposal.

Rank	Audience	If "Other", specify
1	Academic sector/peers, including scholarly associations	
2	Professional and/or scholarly associations	
3	Federal government	
4	Provincial/territorial government	
5	General public	

Family name, Given name
Hryshko, Dmytro

Expected Outcomes Summary

Describe the potential benefits/outcomes (e.g., evolution, effects, potential learning, implications) that could emerge from the proposed research and/or other partnership activities.

The research program will improve understanding of the measurement of consumption insurance. The use of quantitative life cycle macroeconomic models for informing public policies is commonplace; yet, the uncertainty about one of the important
targets they should match---the amount of insurance consumers are able to achieve in the data---creates uncertainty about potential effects of a given policy (e.g., unemployment insurance), and may lead to an inefficient use of public funds (e.g., underfunding unemployment insurance if the measured consumption insurance is found to be high in the data). The findings of the proposed research program will enable a more precise calibration of quantitative macroeconomic models, a more precise formulation of public policies aimed at maintaining and improving individual standards of living, and a more efficient use of public funds.

The research program will inform applied researchers on the perils of consumption imputation that is becoming commonplace nowadays, and on the reasonable ways to deal with imputation of missing income values. Since many results are of methodological value, they will be useful not only to macroeconomists but applied economists in general, statisticians, and social scientists from other disciplines. It will also inform the designers of publicly available surveys on the effects of the gender of the respondent to survey questionnaires on the measurement of consumption and income dynamics. There is already an interest in the findings of such research from the stuff of the Panel Study of Income Dynamics, the world's longest-running household panel survey.

I plan to train two PhD students who will be exposed to a variety of household panel and cross-sectional surveys (e.g., the PSID in the U.S., Survey of Family Expenditures in Canada, GSOEP in Germany, BHPS in Britain), quantitative life-cycle models, and cutting-edge panel data econometric methods. I will also incorporate the results into my undergraduate and graduate classes in macroeconomics as consumption theory is a crucial part of macroeconomics training.

Research Team, Previous Output and Student Training

A. Description of the research team

I will collaborate on this project with Iourii Manovskii. We have two completed papers currently in submission that are highly relevant for the research proposal. Iourii is a leading world expert in the fields of macroeconomics and labor economics. Together, we have expertise in quantitative macroeconomic models, labor economics, and have experience of working with large administrative datasets from Germany and Denmark.

- **Dmytro Hryshko** (the Applicant) received his PhD in Economics from the University of Houston in 2006. He is currently an Associate Professor in the Department of Economics at the University of Alberta. He was a Visiting Lecturer at the University of Cambridge in 2013–2014, Visiting Professor at Kyiv School of Economics in 2011, and Vising Researcher at Copenhangen Business School and Center for Macroeconomic Research in Cologne in 2011–2012. Dr. Hryshko will be responsible for all of the aspects of the proposed research, the data work and calibration and simulation of quantitative life cycle models, and will spend about 75% of research time on the proposed research during years 1–4.

- **Iourii Manovskii** (Collaborator) holds his PhD in Economics from the University of Western Ontario received in 2004. He is currently an Associate Professor in the Department of Economics at the University of Pennsylvania, USA. He is Research Associate at the National Bureau of Economic Research (NBER), Research Affiliate at the Center for Economic Policy Research (CEPR), Executive Director of the Philadelphia Federal Statistical Research Data Center, and member of the Executive Committee of the Federal Statistical Research Data Center Program. Dr. Manovskii will be responsible for all of the aspects of the proposed research, and will contribute up to 50% towards the resulting research output.

B. Description of previous and ongoing research results

Research by the applicant

My research interests are in macro, labor economics, and household finance and can be grouped into the following three broad themes: 1) projects on consumption sensitivity to income and wealth shocks, 2) projects on income inequality and modeling individual income dynamics, and 3) projects on preference heterogeneity, household finance and education. Research in groups 1) and 2), described in more detail below, is most relevant to the proposed research.

1) In theory, household choices of consumption and wealth should reveal information about the nature of household income risk. The Permanent Income Hypothesis, for example, predicts that household consumption fully absorbs permanent shocks to income, while the reaction of consumption to transitory shocks is negligible for an unconstrained household. In Hryshko (2014; *Journal of Economic Dynamics and Control*) I exploit this idea—that consumption choices should be informative about income shocks—to examine excess smoothness of household consumption in the environment characterized by an arbitrary correlation of the shocks. I find that negatively correlated income shocks result in smoother consumption, and upward-biased estimates of the insurance against transitory (and permanent when borrowing constraints are not tight) income shocks. On the methodological side, this paper is most relevant for the first project in the proposed research.

Recent influential research on the sensitivity of household consumption to the shocks to net family incomes revealed substantial consumption insurance against permanent income shocks among U.S. households. As U.S. households typically hold insignificant amounts of assets, the finding represents a puzzle—U.S. households are said to be excessively insured. In Hryshko and Manovskii (2016, submitted) we find that the puzzle disappears—that is, household consumption is not excessively smooth in the data—once we properly take into account heterogeneity among U.S. households. This paper is most relevant for the second project of the proposed research.

In popular and academic press, one of the conjectures advanced for explanation of a persistently high unemployment rate during the Great Recession in the U.S. was an insufficient job-related mobility of homeowners with negative home equity. In Demyanyk, Hryshko, Luengo-Prado, and Sørensen (*American Economic Journal: Macroeconomics*, 2017), we use individual-level credit reports merged with loan-level mortgage data to estimate how home equity interacted with mobility in relatively weak and strong labor markets in the United States during the Great Recession. We construct a dynamic model of housing, consumption, employment, and relocation, which provides a structural interpretation of our empirical results and allows us to explore the role that foreclosure played in labor mobility. We find that negative home equity is not a significant barrier to job-related mobility because the benefits of accepting an out-of-area job outweigh the costs of moving. This paper is most relevant for the first project of the proposed research.

A large recent literature was devoted to understanding consumption fluctuations prior to and during the Great Recession. A number of hypotheses had been advanced but there is no systematic study of the relative importance of different determinants of consumption during the first decade of the new millennium. Demyanyk, Hryshko, Luengo-Prado, and Sørensen (revised and resubmitted to *Economica*) takes on this task, and reveals a number of facts potentially important for policymaking and structural modeling of consumption during the period.

2) In the data, individuals with the same observable characteristics (e.g., age, work experience, education, occupation, etc.) substantially differ in their incomes suggesting that much of the observed variation in incomes is idiosyncratic. Idiosyncratic labor incomes are typically modeled either by stochastic processes featuring heterogeneous income profiles (HIP) or restricted income profiles (RIP). Using data on idiosyncratic labor income growth from the Panel Study of Income Dynamics, Hryshko (*Quantitative Economics*, 2012) finds that the HIP model can be rejected. The RIP model with a permanent component cannot be rejected. This result is important for an appropriate choice of modeling the heterogeneity in individual incomes and calibrating/estimating macro models with incomplete insurance markets and heterogeneous agents.

   The stochastic process for earnings is the key element of incomplete markets models in modern quantitative macroeconomics. Daly, Hryshko, and Manovskii (NBER Working Paper No. 22938, submitted) show that a simple modification of the canonical process used in the literature—the RIP model mentioned above—leads to a dramatic improvement in the measurement of earnings dynamics in administrative and survey data alike. Empirically, earnings at the start or end of earnings spells are lower and more volatile than the observations in the interior of earnings histories, reflecting the effects of working less than the full year as well as deviations of wages due to e.g. tenure effects. Ignoring these properties of earnings, as is standard in the literature, leads to a substantial mismeasurement of the variances of permanent and transitory shocks and induces the large and widely documented divergence in the estimates of these variances based on fitting the earnings moments in levels or growth rates. Accounting for these effects enables more accurate analysis using quantitative models with permanent and transitory earnings risk, and improves empirical estimates of consumption insurance against permanent earnings shocks. This paper is most relevant for the first project of

the proposed research.

Hryshko, Juhn, and McKue (*Labour Economics*, 2017) examine changes in inequality and instability of the combined earnings of married couples over the 1980–2009 period using Social Security earnings data matched to Survey of Income and Program Participation panels. Relative to male earnings inequality, the inequality of couples' earnings is both lower in levels and rises by a smaller amount. We also find that couples' earnings instability is lower in levels compared to male earnings instability and actually declines in these data. While wives' earnings played an important role in dampening the rise in inequality and year-to-year variation in resources at the family level, we find that marital sorting and coordination of labor supply decisions at the family level played a minor role. Comparing actual couples to randomly paired simulated couples, we find very similar trends in earnings inequality and instability.

3) In theory, household choices of consumption, savings and asset portfolio are affected by attitudes towards risk. However, little is known empirically what determines individual heterogeneity in those attitudes. Hryshko, Luengo-Prado, and Sørensen (*Quantitative Economics*, 2011) examine the determinants of individual attitudes towards risk and, in particular, why some individuals exhibit extremely high risk aversion. Using data from the Panel Study of Income Dynamics we find that individuals' risk aversion is strongly influenced by the educational accomplishments of their parents. Other significant determinants of risk aversion are age, sex, and parents' risk aversion. We verify that risk aversion matters for economic behavior: it predicts individuals' volatility of income, and how likely households are to own businesses.

   Hryshko, Luengo-Prado, and Sørensen (*The B.E. Journal of Economic Analysis & Policy, Contributions*, 2012) study the effect of education on equity ownership in the form of stocks or mutual funds (outside of retirement accounts). We find a causal effect of education on stockholding using the number of colleges in the county where the respondent grew up as an instrument and data from the Panel Study of Income Dynamics. The effect is particularly strong for whites from non-privileged backgrounds. We explore the channels through which education affects equity holdings using the Wisconsin Longitudinal Survey and find that, controlling for family fixed effects, increased cognition and features associated with having a white collar job appear to be the main channels.

Research by co-applicants

Iourii Manovskii's research is in macroeconomics and labor. Below, I've listed a number of his publications most relevant for the current researh proposal.

Groes, Fane, Philipp Kircher, and Iourii Manovskii (2015): "The U-Shapes of Occupational Mobility," *Review of Economic Studies*, 82(2), pp. 659-692.
Hagedorn, Marcus and Iourii Manovskii (2013): "Job Selection and Wages over the Business Cycle," *American Economic Review*, 103 (2), pp.771-803.
Jeong, Hyeok, Yong Kim, and Iourii Manovskii (2015): "The Price of Experience," *American Economic Review*, 105(2), pp. 784-815.
Kambourov, Gueorgui and Iourii Manovskii (2009): "Occupational Mobility and Wage Inequality," *Review of Economic Studies*, 76 (2), pp. 731-759.
Kambourov, Gueorgui and Iourii Manovskii (2009): "Occupational Specificity of Human Capital," *International Economic Review*, 50 (1), pp. 63-115.

C. Description of proposed student training strategies

I plan to train up to two doctoral students over the course of the project (either 1 student during 4 years or 2 students, each working on the project for 2 years). Students will be responsible for assisting in collecting the data, coding programs related to the data, helping with literature reviews and building quantitative life cycle models.

Students will learn quantitative methods and panel data econometrics, and simulated methods in econometrics such as the method of simulated moments, and indirect inference. The department is currently not offering courses providing the relevant expertise, and an exposure of students to such knowledge will make them more marketable on the job market, both in academia and in business. The students will also get exposure to a variety of household panel datasets which will help them in gathering and working with the data for their independent dissertation projects. I am regularly teaching the first-year graduate macroeconomics and a regular member of the macroeconomics comprehensive exam committee which will help me identify interested and capable students right after they pass their comprehensive exams. I will mentor the students in effective writing and will help them prepare for presentations and develop their scientific communication skills.

Family name, Given name
Hryshko, Dmytro

Funds Requested from SSHRC

For each budget year, estimate as accurately as possible the research costs that you are asking SSHRC to fund through a grant. For each Personnel costs category, enter the number of individuals to be hired and specify the total amount required. For each of the other categories, enter the total amount required.

Personnel costs	Year 1		Year 2		Year 3		Year 4		Year 5	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount	No.	Amount
Student salaries and benefits/Stipends										
Undergraduate										
Masters										
Doctorate	1	17,395	1	17,917	1	18,454	1	19,008	0	0
Non-student salaries and benefits/Stipends										
Postdoctoral										
Other										

Travel and subsistence costs	Year 1	Year 2	Year 3	Year 4	Year 5
Applicant/Team member(s)					
Canadian travel	2,500	2,500	5,000	2,500	0
Foreign travel	3,500	3,500	3,500	3,500	0
Students					
Canadian travel					
Foreign travel					

Other expenses					
Professional/Technical services					
Supplies	4,880	1,000	1,000	1,000	0
Non-disposable equipment					
Computer hardware	5,500	0	0	0	0
Other					
Other expenses (specify)					
Total	33,775	24,917	27,954	26,008	0

Budget Justification

Personnel Costs

Student salaries

I would like to support up to two graduate students (or one student over the course of 4 years). Students are expected to help working with the data, programming in various softwares, conducting literature reviews and building quantitative life cycle models. The 2016/2017 salary rate for PhD students at the University of Alberta is calculated at $17,395, based on two 4-month term appointments and the workload of 12 hours per week (a contract for 2 semesters). For years 2–4 of the project, the salary rate was scaled up by the factor 1.03 each year to accommodate an increase of 3% per year for mandatory contract increases.

Travel and subsistence costs

I (and, possibly, my collaborator in some years of the project) plan to attend one conference in North America and one international conference each year (e.g., Europe).

I budgeted $2,500 for North American travel each year but year 3 for which I am requesting twice the amount (explanation of the latter is provided below). I am planning to attend prestigious conferences in North America such as the NBER Summer Institute (Consumption group), Canadian Macro Study Group, meetings of the Society of Labor Economists, and American Economic Association (AEA) Meetings. Seven of my papers, published and submitted, have been presented at the NBER Summer Institute, and I have benefited immensely from discussion of my research at that venue. Three of my papers have been presented at the AEA meetings (and one is scheduled for presentation at the meetings in 2018 to be held in Philadelphia), one of the most widely attended conferences attracting top researchers from around the world. Presentation at these venues would greatly enhance the visibility and potential impact of my research. My estimate of expenses is based on reimbursement of the costs of attendance of the AEA conference held in January 2017 in Chicago that amounted to about $2,000 (includes an economy-class airfare in the amount of $637.57, a 3-night hotel stay at the cost of $808.02, per diem expenses in the amount of $210 ($60×3+incidental expenses of $30, both at the University of Alberta rates), taxi fares in the amount of $249.83, and conference registration fee at $91) and an estimate of a more expensive trip to the NBER Summer Institute in Boston (consumption meetings last for 5 days which requires a 6-night stay totalling about $1,700 at the current exchange rate, an airfare would amount to about $1,000; just summing these two items would amount to more than $2,500). In year 3, I am asking twice the amount to accommodate a visit of my collaborator, Iourii Manovskii, to the University of Alberta. This would accommodate a round-trip airfare from Philadelphia to Edmonton at about $1,000, a 3 to 5-night stay in a hotel in Edmonton, per diem expenses, and taxi fares. I am planning to combine his visit with an academic seminar which would benefit the department and graduate students.

I budgeted $3,500 towards participation in international conferences and workshops such as, e.g., annual meetings of the Society for Economic Dynamics (SED), or meetings of the European Economic Association. My estimate is based on reimbursement of the costs of attendance of SED meetings in Edinburgh in 2017 (includes an economy-class airfare at $1,200, hotel accommodation at $780, conference registration at $500, per diem expenses at $510 (6 days times $85 a day at the University of Alberta rate), taxi fares at $240, and UK visa at $260). Participation in international conferences such as that organized by SED is of high value as they attract peers from a variety of universities from North America and all over the world, and policy institutions such as Bank of Canada, European Central Bank and Federal Reserve Banks of the U.S. presenting new, cutting-edge research in economics; feedback from such conferences is typically of high value.

Other expenses

Supplies

I am requesting, for each year, $1,000 for software updates and renewals, journal subscriptions, book purchases, photocopies, journal submission fees, maintenance of printer, and other miscellaneous expenses (e.g., annual renewal of my Dropbox subscription for backing up the data, and working with my collaborator). In year one, in addition, I am requesting for an upgrade of my current license for Stata/MP 11 to Stata/MP 14 8 cores at an estimated cost of $1,360, purchase of a Stat Transfer Single User Perpetual License for $433, an upgrade of my Gauss license from version 8 to the current version 17 quoted at $660 as of January 2017, and purchase of an Intel parallel studio XE with Fortran Compiler at an estimated cost of $1,427. Together with miscellaneous expenses of $1,000, these software upgrades and purchases would amount to $4,880 in year one. All prices are at the discounted Academic level. These purchases and upgrades will improve my efficiency of dealing with large administrative datasets and simulated data, and estimating quantitative life-cycle models.

Computer hardware

To work with large datasets and to run and estimate quantitative life-cycle models, I need an up-to-date desktop computer. I estimated its cost at $3,000; it will replace my current office desktop computer purchased in 2006. In addition, to perform similarly complex tasks without being tied to an office space, I will need a light but powerful laptop, the cost of which is estimated at about $2,500.

Family name, Given name
Hryshko, Dmytro

Funds from Other Sources

You must include all other sources of funding for the proposed research. Indicate whether these funds have been confirmed or not.

Full organization name Contribution type	Confirmed	Year 1 Year 5	Year 2	Year 3	Year 4
	☐				
	☐				
	☐				
	☐				
	☐				
	☐				
	☐				
	☐				
	☐				
Total funds from other sources		0	0	0	0
		0			

Suggested Reviewers

List Canadian or foreign specialists whom SSHRC may ask to assess your proposal.
List keywords that best describe the assessor's areas of research expertise. Please refer to the Suggested Assessors section of the detailed instructions for more information on conflicts of interest.

Family name	Given name	Initials	Title
Kuhn	Moritz		Dr.

Org. code:
Full organization name: University of Bonn
Keywords: income and wealth inequality; life cycle models; human capital; consumption insurance; quantitative macroeconomics
Department/Division name: Economics
Address: Adenauerallee 24 - 42, Bonn
Telephone number: Country code 49, Area code 228, Number 7362096, Extension
Fax number:
Country: GERMANY
E-mail: mokuhn@uni-bonn.de

Family name	Given name	Initials	Title
Gallipoli	Giovanni		Dr.

Org. code:
Full organization name: University of British Columbia
Keywords: life cycle models; idiosyncratic shocks; quantitative macroeconomics; disability; human capital
Department/Division name: Vancouver School of Economics
Address: University of British Columbia, Vancouver School of Economics, 6000 Iona Drive
City/Municipality: Vancouver
Prov./State: BC
Postal/Zip code: V6T1L4
Telephone number: Country code 1, Area code 604, Number 8224724, Extension
Fax number:
Country: CANADA
E-mail: giovanni.gallipoli@ubc.ca

Family name	Given name	Initials	Title
Michaelides	Alexander		Dr.

Org. code:
Full organization name: Imperial College London
Keywords: life cycle models; housing; quantitative macroeconomics; household finance
Department/Division name: Finance
Address: Imperial College Business School, South Kensington Campus, London
Telephone number: Country code 44, Area code 020, Number 75949177, Extension
Fax number:
Country: UNITED KINGDOM
E-mail: a.michaelides@imperial.ac.uk

Personal information will be stored in the Personal Information Bank for the appropriate program.

Exclusion of potential reviewers

In my opinion, Fatih Guvenen, Professor at the University of Minnesota, is unlikely to provide an impartial review. In Hryshko (*Quantitative Economics*, 2012) I criticized a model of income heterogeneity he was advancing for use in life-cycle quantitative models in Guvenen (*Review of Economic Dynamics*, 2009; *American Economic Review*, 2007) and Guvenen and Smith (*Econometrica*, 2014).

Do not photocopy this page.

Internal use	CID (if known)
458602	

Identification

Only the information in the Name section will be made available to selection committee members and external assessors. Citizenship and Statistical and Administrative Information will be used by SSHRC for administrative and statistical purposes only. Filling out the statistical and Administrative Information section is optional.

Name

Family name	Given name	Initials	Title
Hryshko	Dmytro		Dr.

Citizenship - Applicants and co-applicants must indicate their citizenship status by checking and answering the applicable questions.

Citizenship status					Have you applied for permanent residency?
◯ Canadian	◉ Permanent resident since (yyyy/mm/dd) 2012/06/07	◯ Other (country)			◯ Yes ◯ No

Statistical and Administrative Information

Birth year	Gender	Permanent postal code in Canada (i.e. K2P1G4)	Correspondence language	Previous contact with SSHRC? (i.e. applicant, assessor, etc.)
1977	◯ F ◉ M	T5M0L4	◉ English ◯ French	◯ Yes ◉ No

Full name used during previous contact, if different from above

Contact Information

The following information will help us to contact you more rapidly. Secondary information will not be released by SSHRC without your express consent.

Primary telephone number				Secondary telephone number			
Country code	Area code	Number	Extension	Country code	Area code	Number	Extension
1	780	4922544		1	587	5911339	

Primary fax number				Secondary fax number			
Country code	Area code	Number	Extension	Country code	Area code	Number	Extension

Primary E-mail dhryshko@ualberta.ca

Secondary E-mail

Personal information will be stored in the Personal Information Bank for the appropriate program.

Checked
Web CV
2017/10/16

Do not photocopy this page.

Family name, Given name

Hryshko, Dmytro

Current Address

Use only if you are not affiliated with a department at a Canadian university. (If you are affiliated with a department at a Canadian university, the department's mailing address will be used.) If you wish to use another address, specify it under the Correspondence Address.

Address

City/Municipality | Prov. / State | Postal/Zip code

Country

Correspondence Address

Complete this section if you wish your correspondence to be sent to an address other than your current address.

Address

City/Municipality | Prov. / State | Postal/Zip code

Country

Temporary Address

If providing a temporary address, phone number and/or E-mail, ensure that you enter the effective dates.

Address

City/Municipality | Prov./ State

Country

Start date (yyyy/mm/dd)

End date (yyyy/mm/dd)

Temporary E-mail

Permanent Address in CANADA

Address

10842 125 ST. NW

City/Municipality | Prov./ State | Postal/Zip code

Edmonton | AB | T5M0L4

Country CANADA

Temporary telephone/fax number

Country code | Area code | Number | Extension

Do not photocopy this page.

Family name, Given name
Hryshko, Dmytro

Research Expertise (optional)

The information provided in this section refers to your own research expertise, not to a research proposal. Filling out the following 4 sections is optional. This page will not be seen by selection committee members and external assessors. This section will be used for planning and evaluating programs, producing statistics, and selecting external assessors and committee members.

Areas of Research

Indicate and rank up to 3 areas of research that best correspond to your research interests as well as areas where your research interests would apply. Duplicate entries are not permitted.

Rank	Code	Area
1	200	Family
2	230	Housing
3	140	Education

Temporal Periods

If applicable, indicate up to 2 historical periods covered by your research interests.

From	To
Year BC AD	Year BC AD
_____ ◯ ◯	_____ ◯ ◯
_____ ◯ ◯	_____ ◯ ◯

Geographical Regions

If applicable, indicate and rank up to 3 geographical regions covered by your research interests. Duplicate entries are not permitted.

Rank	Code	Region
1	1000	North America
2	3000	Europe
3	3100	Scandinavia

Countries

If applicable, indicate and rank up to 5 countries covered by your research interests. Duplicate entries are not permitted.

Rank	Code	Countries	Prov./ State
1	1200	UNITED STATES	
2	3101	DENMARK	
3	3206	GERMANY	
4			
5			

Curriculum Vitae

Family name, Given name: Hryshko, Dmytro

Language Proficiency

	Read	Write	Speak	Comprehend aurally
English	X	X	X	X
French				

Other languages: Ukrainian, Russian

Work Experience

List the positions, academic and non-academic, you have held beginning with the current position and all previous positions in reverse chronological order, based on the start year.

Current position: Associate Professor — Start date (yyyy/mm): 2006/7

Org. code: 1480111 — Full organization name: University of Alberta

Department/Division name: Economics

Position type: (●) Tenured ( ) Non-tenure ( ) Tenure-track ( ) Non-academic

Employment status: (●) Full-time ( ) Part-time ( ) Non-salaried ( ) Leave of absence

Position: Lecturer — Start date (yyyy/mm): 2013/8 — End date (yyyy/mm): 2014/8

Org. code: 9121109 — Full organization name: University of Cambridge

Department/Division name: Faculty of Economics

Position: Visiting Scholar — Start date (yyyy/mm): 2012/9 — End date (yyyy/mm): 2012/12

Org. code: 9129108 — Full organization name: Copenhagen Business School

Department/division name: Economics

Position: Visiting Scholar — Start date (yyyy/mm): 2011/8 — End date (yyyy/mm): 2012/7

Org. code: 9147106 — Full organization name: University of Cologne

Department/Division name: Center for Macroeconomic Research

Family name, Given name
Hryshko, Dmytro

Work Experience (cont'd)

Position	Start date (yyyy/mm)	End date (yyyy/mm)
Visiting Professor	2011/5	2011/6

Org. code	Full organization name
9239043	Kyiv School of Economics

Department/Division name: Faculty

Position	Start date (yyyy/mm)	End date (yyyy/mm)

Org. code	Full organization name

Department/Division name:

Position	Start date (yyyy/mm)	End date (yyyy/mm)

Org. code	Full organization name

Department/Division name:

Position	Start date (yyyy/mm)	End date (yyyy/mm)

Org. code	Full organization name

Department/Division name:

Position	Start date (yyyy/mm)	End date (yyyy/mm)

Org. code	Full organization name

Department/Division name:

Family name, Given name: Hryshko, Dmytro

Academic Background

List up to 5 degrees, beginning with the highest degree first and all others in reverse chronological order, based on the start date.

Degree type	Degree name	Start date (yyyy/mm)	Expected date (yyyy/mm)	Awarded date (yyyy/mm)
Doctorate	PhD	2001/09		2006/05

Disc. code	Discipline	Did SSHRC support enable you to get this degree?
61000	Economics	◯ Yes ◉ No

Org. code	Organization
9969105	University of Houston

Country: UNITED STATES

Degree type	Degree name	Start date (yyyy/mm)	Expected date (yyyy/mm)	Awarded date (yyyy/mm)
Master's		1999/09		2001/05

Disc. code	Discipline	Did SSHRC support enable you to get this degree?
61000	Economics	◯ Yes ◉ No

Org. code	Organization
9239020	National University of Kyiv-Mohyla Academy

Country: UKRAINE

Degree type	Degree name	Start date (yyyy/mm)	Expected date (yyyy/mm)	Awarded date (yyyy/mm)

Disc. code	Discipline	Did SSHRC support enable you to get this degree?
		◯ Yes ◯ No

Org. code	Organization

Country:

Degree type	Degree name	Start date (yyyy/mm)	Expected date (yyyy/mm)	Awarded date (yyyy/mm)

Disc. code	Discipline	Did SSHRC support enable you to get this degree?
		◯ Yes ◯ No

Org. code	Organization

Country:

Degree type	Degree name	Start date (yyyy/mm)	Expected date (yyyy/mm)	Awarded date (yyyy/mm)

Disc. code	Discipline	Did SSHRC support enable you to get this degree?
		◯ Yes ◯ No

Org. code	Organization

Country:

Family name, Given name

Hryshko, Dmytro

Credentials

List up to 6 licences, professional designations, awards and distinctions you have received and feel would be the most pertinent to the adjudication of your application. List them in reverse chronological order, based on the year awarded.

Category	Name	Source or Country	Duration (Months)	Value / Year awarded

Research Expertise

The information provided in this section refers to your own research expertise, not to a research proposal.

Keywords

List keywords that best describe your areas of research expertise. Separate keywords with a semicolon.

consumption; housing; preference formation; income dynamics; macroeconomics

Disciplines

Indicate and rank up to 5 disciplines that best correspond to your research interests. Duplicate entries are not permitted.

Rank	Code	Discipline	If Other, specify
1	61011	Macroeconomics and Monetary Economics	
2	61020	Labour and Demographic Economics	
3			
4			
5			

Family name, Given name
Hryshko, Dmytro

Funded Research

List up to 8 grants or contracts you have received from SSHRC or other sources. List them in reverse chronological order, based on the year awarded. If you are not the applicant (principal investigator), specify that persons' name.

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)
1	University of Alberta	2017	$4,200

Role: Applicant — Completion status: [X] Complete

Project title: Killam Research Fund

Applicant's family name	Applicant's given name	Initials
Hryshko	Dmytro	

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)
1	University of Alberta	2017	$2,800

Role: Applicant — Completion status: [X] Complete

Project title: Support for Advancement of Scholarship Grant

Applicant's family name	Applicant's given name	Initials
Hryshko	Dmytro	

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)
1	Danish Council for Independent Research (FSE)	2012	$325,000

Role: Co-applicant — Completion status: [X] Complete

Project title: Interpreting Individual Earnings Dynamics

Applicant's family name	Applicant's given name	Initials
Daly	Moira	

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)
1	University of Alberta	2011	$2,800

Role: Applicant — Completion status: [X] Complete

Project title: Killam Research Fund

Applicant's family name	Applicant's given name	Initials
Hryshko	Dmytro	

Family name, Given name
Hryshko, Dmytro

Funded Research (cont'd)

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)
1	University of Alberta	2011	$1,500

Role: Applicant — Completion status: [X] Complete

Project title: Support for Advancement of Scholarship Grant

Applicant's family name	Applicant's given name	Initials
Hryshko	Dmytro	

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)

Role — Completion status: [ ] Complete

Project title

Applicant's family name	Applicant's given name	Initials

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)

Role — Completion status: [ ] Complete

Project title

Applicant's family name	Applicant's given name	Initials

Org. code	Full name of funding organization	Year awarded (yyyy)	Total amount (CAN$)

Role — Completion status: [ ] Complete

Project title

Applicant's family name	Applicant's given name	Initials

1 Research Contributions Over the Last Six Years

Refereed contributions

1. "Trends in Earnings Inequality and Earnings Instability Among Couples: How Important is Assortative Matching?" Joint with Chinhui Juhn and Kristin McCue. *Labour Economics*, 48, 2017, pp. 168–182. (Role: Equal authorship.)

2. "Moving to a Job: The Role of Home Equity, Debt, and Access to Credit." Joint with Yuliya Demyanyk, Maria Luengo-Prado and Bent Sørensen. *American Economic Journal: Macroeconomics*, 9(2), 2017, pp. 149–181. (Role: Equal authorship.)

3. "Correlated Income Shocks and Excess Smoothness of Consumption." *Journal of Economic Dynamics and Control*, 48 (2014), pp. 41-62. (Role: Sole authorship.)

4. "The Effect of Education on Equity Holdings." Joint with Maria Luengo-Prado and Bent Sørensen. *The B.E. Journal of Economic Analysis & Policy, Contributions*, 12 (1), 2012, Article 10. (Role: Equal authorship.)

5. "Labor income profiles are not heterogeneous: Evidence from income growth rates." *Quantitative Economics*, 3 (2012), 177–209, (lead article). (Role: Sole authorship.)

6. "Childhood Determinants of Risk Aversion: The Long Shadow of Compulsory Education." Joint with Maria Luengo-Prado and Bent Sørensen. *Quantitative Economics*, 2 (2011), pp. 37-72. (Role: Equal authorship.)

Non-refereed contributions

1. "Why Has Consumption Been So Volatile in the New Millennium?" Joint with Yuliya Demyanyk, Daniel Kolliner, Maria Luengo-Prado and Bent Sørensen, *Economic Commentary*, Federal Reserve Bank of Cleveland, July 2015.

2. "Keeping the House or Moving for a Job." Joint with Yuliya Demyanyk, Maria Luengo-Prado and Bent Sørensen, *Economic Commentary*, Federal Reserve Bank of Cleveland, July 2013.

Other refereed contributions: presentations at conferences

2018: American Economic Association Meetings in Philadelphia (scheduled)
2017: Asian Meeting of the Econometric Society, Hong Kong (invited session); Society for Economic Dynamics, Edinburgh; Workshop on Household Finance and Retirement Savings at Collegio Carlo Alberto, Turin (scheduled 19-20 October 2017)
2016: 24th CEPR European Summer Symposium in International Macroeconomics (ESSIM), 24-27 May 2016, Helsinki, Finland; the 2016 PSID Annual User Conference
2015: Workshop on Mobility and Consumption, Milan (June 12); Workshop on the Interaction between Housing and the Economy, Berlin (June 22–23); Society for Economic Dynamics Meetings, Warsaw (June 25–27); World Congress of the Econometric Society, Montreal (August 17–21); European Central Bank Conference on Household Finance and Consumption (December 17–18)
2014: Workshop on Labor Mobility, the Housing Market and Labor Market Outcomes, Louvain-la-Neuve (22–23 May, scheduled); Workshop on the Estimation of Economic Models of Earnings Dynamics, Paris (June 12–13, scheduled)

2013: AEA Meetings in San Diego, European Meetings of Econometric Society; 1st CSEF Conference on Finance and Labor, Anacapri (26–27 August)
2012: 4th Danish Microeconometric Network Meeting, Copenhagen (June); 11th Macroeconomic Policy Research Workshop on Microeconomic Behavior and its Macroeconomic Implications During the Financial Crisis, Budapest (September 6–7); Household Behaviour in Mortgage and Housing Markets Conference, Oxford (September 20–22); 2012 Cologne workshop on macroeconomics (discussant and presenter, October 1–2)

Other refereed contributions: presentations at invited seminars

2012–2015: Center for Macroeconomic Research, University of Cologne; Copenhagen Business School; University of Copenhagen; University of Cyprus; Norwegian Business School; University of Cambridge; Concordia University; University of Delaware
2016–2017: Copenhagen Business School; University of Saskatchewan; Concordia University

Forthcoming contributions

1. "Improving the Measurement of Earnings Dynamics." Joint with Moira Daly and Iourii Manovskii. NBER Working Paper # 22938 (2016) (submitted).

2. "The Rise and Fall of Consumption in the '00s." Joint with Yuliya Demyanyk, Maria Luengo-Prado and Bent Srensen. Manuscript (revised and resubmitted to *Economica*).

3. "How Much Consumption Insurance in the U.S.?" Joint with Iourii Manovskii. Manuscript (submitted).

2 Other research contributions

None of note.

3 Most Significant Career Research Contributions

1. "Childhood Determinants of Risk Aversion: The Long Shadow of Compulsory Education." Joint with Maria Luengo-Prado and Bent Sørensen. *Quantitative Economics*, 2 (2011), pp. 37-72.

   We examine the determinants of individual attitudes towards risk and, in particular, why some individuals exhibit extremely high risk aversion. 68 citations on Google Scholar.

2. "Labor income profiles are not heterogeneous: Evidence from income growth rates." *Quantitative Economics*, 3 (2012), 177–209, (lead article).

   Idiosyncratic labor incomes are typically modeled either by stochastic processes featuring heterogeneous income profiles (HIP) or restricted income profiles (RIP). Using data on idiosyncratic labor income growth from the Panel Study of Income Dynamics, I find that the estimated variance of deterministic income growth is zero, i.e., the HIP model can be rejected. The RIP model with a permanent component cannot be rejected. This result is important for an appropriate choice of modeling the heterogeneity in individual incomes and calibrating/estimating macro models with incomplete insurance markets and heterogeneous agents. 44 citations on Google Scholar.

3. "Moving to a Job: The Role of Home Equity, Debt, and Access to Credit." Joint with Yuliya Demyanyk, Maria Luengo-Prado and Bent Sørensen. *American Economic Journal: Macroeconomics*, 9(2), 2017, pp. 149–181.

   We use individual-level credit reports merged with loan-level mortgage data to estimate how home equity interacted with mobility in relatively weak and strong labor markets in the United States during the Great Recession. We construct a dynamic model of housing, consumption, employment, and relocation, which provides a structural interpretation of our empirical results and allows us to explore the role that foreclosure played in labor mobility. The findings of this article were mentioned by *Forbes; Fox Business; Economist's View; Housing Wire; Real Estate Economy Watch; Inside Mortgage Finance; Moody's Blog; National Mortgage Professional; Wall Street Journal; Brookings.*

4. "House Prices and Risk Sharing." Joint with Maria Luengo-Prado and Bent Srensen. *Journal of Monetary Economics*, 57 (2010), pp. 975-987.

   Using data from the Panel Study of Income Dynamics, we find that homeowners are able to maintain a high level of consumption following job loss (or disability) in the periods of rising local house prices while the consumption drop for homeowners who lose their job in times of lower house prices is substantial. A calibrated model of endogenous homeownership and consumption is able to reproduce the patterns in the data quite well and provides an interpretation of the empirical results. 48 citations on Google Scholar.

5. "Improving the Measurement of Earnings Dynamics." Joint with Moira Daly and Iourii Manovskii. NBER Working Paper # 22938 (2016) (submitted).

   The stochastic process for earnings is the key element of incomplete markets models in modern quantitative macroeconomics. We show that a simple modification of the canonical process used in the literature leads to a dramatic improvement in the measurement of earnings dynamics in administrative and survey data alike.

4 Career Interruptions and Special Circumstances

None.

5 Contributions to Training

1. Max Sties (University of Alberta, Economics 2017, PhD). *Forecasting Recessions in a Big Data Environment.* Role: Dissertation committee member.

2. Kolja Ortmann (University of Cambridge, Faculty of Economics 2014, Master of Philosophy). *Missing observations and their effect on the estimated variances of shocks to earnings: a sensitivity analysis of Gottschalk et al. (Economic Journal, 2002) and Altonji et al. (Econometrica, 2013).* Role: Supervisor. His thesis was largely based on my, then on-going research about earnings dynamics using administrative data from Denmark and Germany.

3. Robert McKay White (University of Alberta, Economics 2013). *Essays on the 2007-08 Financial Crisis and the Global Asset Shortage.* Role: Dissertation committee member.

I also served as an external reviewer of two PhD theses—by Duangsuda Sopchokchai from the University of Ottawa and Yutong Pang from Vancouver School of Economics.