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Abstract

This paper proposes to apply diversity indices to the study of wealth composition. At the individual level a diversity index like the so-called Gini-Simpson index would then measure the probability that two dollars, drawn randomly from the total wealth of an individual, are allocated to two different types of wealth. Other diversity indices, such as entropy related indices, may be similarly defined when analyzing the composition of wealth.

These basic ideas will then be applied to the study of wealth in the United States. The recession which started in the United States in December 2007 has affected numerous families and in many ways. Families have seen an increase in unemployment, had serious difficulties in meeting debt obligation and had to face changing levels of income and wealth, to mention just a few of the problems they had to deal with. Some of the literature examining the effect of the recession on the well-being of households has examined income and wealth levels and inequality and have found that although wealth levels have fallen and inequality has increased the effect has not been uniform across families. In this paper we will investigate the determinants of asset diversity and the impact of life course changes during the period of the Great Recession. We will examine this in the context of financial assets.

We use a unique panel data set that provides us with comprehensive household level income and wealth data for 2007 and 2009 for the United States, the Survey of Consumer Finances.

Key Words: diversity – financial assets - Great Recession – United States - wealth

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1. Introduction

According to modern portfolio theory households would try to minimize risk for a given level of expected return or try to maximize return for a given level of risk by choosing proportions of various assets. The basic assumptions of this theory have been widely challenged by behavioral economics (Campbell, 2006, Guiso et al 2012), but diversification is still seen as a good way to proceed in order to lower risk. Risk is measured as the standard deviation of asset price fluctuations so that by diversifying portfolios and investing in assets whose returns are not perfectly correlated, individuals are supposed to reduce the total variance of their portfolio return.

Not all asset allocations are made in order to reduce risk. For example, saving for a down payment for a house or putting all of your savings in a stock when you are single and in your twenties would not be a strategy to diversify your portfolio and reduce risk, but it could be when you are in your fifties. Whether a portfolio is diversified will depend on the way the money in the portfolio is spread among different types of investments.
Diversification comes from the timeless idea that we should not put all the eggs in one basket so that if one investment loses money, other investments will make up for the losses or even produce a gain. Households allocate their assets among different asset categories in order to diversify their investments.

In this paper, we focus on a somehow different aspect of the diversification of assets. Given a fixed number of assets, we measure how evenly the dollars are distributed between different types of assets so that the higher the diversity, the more equally abundant each type is.

At certain points in their lifetime, households may want to change their asset allocation or their diversification strategy. The most common reason for doing this would be a change in their time horizon. Approaching an investment goal is thus likely to increase the need to change the asset allocation. For example, most people investing for retirement begin to hold less stock and more bonds and cash equivalents as they get closer to retirement age. Households may also change their asset allocation if there is a change in their risk tolerance, financial situation (job loss), or the financial goal itself. During the crisis, we observed large changes in asset prices (Wolff, 2013). These sharp declines in wealth levels, combined with large job losses may have affected portfolio diversification. Some households may have reacted to this, while others may have not. We explore this issue to some extent in the paper, by looking at the determinants of asset diversification and checking whether certain abrupt life events had an impact. Financial advisors typically suggest not to make significant changes in your portfolio during a crisis as assets may move in a similar direction. This is because after such a crisis a diversification strategy may continue to be beneficial.

The goal of our paper is indeed to check to what extent people diversify their portfolio in the US and whether the financial crisis had a significant impact on their portfolio diversification. We also want to identify what is the variation in diversification and the impact of the crisis on different household types.

We contribute to the literature in several ways. First, by defining measures of diversity for assets. This type of measure has been previously used in biology and sociology, but not in household finance and the asset distribution literature. Next, we measure the diversity of assets in the United States in 2007 and 2009 using various measures. We find that in all specifications diversity has increased. We check the robustness of our results using different levels of asset aggregation. The larger the number of assets, the larger the magnitude of the diversity measure. Finally, we estimate the effect of different factors on diversity and its change. We find that diversification increases with age, education and income and that it is lower at the bottom of the distribution, where wealth levels are lower. Life changing situations such as getting divorced or losing one's job have a statistically significant negative effect on a change in diversification, while getting married or having deteriorating health have a positive effect.

In the next section, we provide the conceptual background by presenting some stylized facts on portfolio diversification and the determinants of risky asset allocation taken from empirical literature. In the following section, we describe the data sources and variables. In section 4, the measures of diversity of assets are specified and elaborated. Section 5 -7 are the empirical sections. Section 8 summarizes and concludes.

2. Conceptual Background

2.1 Stylized facts on portfolio diversification

When investing there are two types of risks –market risk (systematic risk common across assets that cannot be eliminated) and idiosyncratic risk (asset-specific and can be diversified). Diversification is the allocation of savings among many different assets.[1] Holding multiple assets reduces idiosyncratic risk. It does not reduce market risk. People diversify in order to reduce their exposure to risk. How much they should diversify will depend on their risk tolerance.

People's risk tolerance depends on their age, education, investment horizon, household composition, resources (income and wealth), labor market situation and a more general preference for risk. Generally, age, gender and marital status are a good proxy for risk tolerance.

2.2 Some stylized facts in the literature

As empirical evidence does not coincide with theory, stylized facts on portfolio allocation can be used as a guide for future analysis. In a 2014 report, Arrondel and co-authors, present evidence on different aspects of portfolio allocation for the Euro area based on a new household survey for 15 countries. In their paper, they run country regressions for all 15 Euro-zone countries (at that time 15 Euro-zone countries participated in the survey) and one regression for the Euro-zone as a whole. If the coefficient is statistically significant in at least 8 countries and is significant in the euro regression and if there were at most one

[1] In our case, it will refer to how evenly dollars are allocated between different types of assets.

country with an opposite significant coefficient, the authors consider this finding as a stylized fact.

Based on this strategy the authors come-up with seven stylized facts for the Euro-zone area regarding ownership and value of assets:

Fact 1: The probability of ownership and the value of a household's main residence, other real estate, risky asset assets and business ownership are positively related to net wealth, even after controlling for other observable household characteristics.

Fact 2: Ownership and the value of both the main residence and other real estate are positively linked to previously having received inheritances

Fact 3: Couples with dependent children are more likely to own as well as to have a more valuable household main residence (relative to singles).

Fact 4: The probability of owning risky assets and their value is positively related to the educational attainment of the head of the household.

Fact 5: The probability of owning and the value of risky assets are higher for single households.

Fact 6: Varying labor market statuses have remarkably little effect on the ownership and values of assets with the obvious exception of the self-employed who are much more likely to own businesses (and to some extent other real estate).

Thus, households that have more net worth, are better educated and single are more likely to own risky assets. Labor market status does not play a very important role except in the case of self-employed. We will come back to this when we discuss our diversification results.

Regressions for risky assets in the euro area indicate that households with children are generally less likely to hold risky financial assets compared to single households, which suggests that households with dependent children have a different risk profile than single households. More educated individuals and those that have higher wealth levels are more likely to hold risky assets. Households with higher incomes are more likely to hold risky assets, which is consistent with intertemporal portfolio models with fixed costs. For given entry or participation costs, higher income and higher wealth are associated with a higher demand for risky assets, because these households have a higher probability to overcome the threshold and decide that it is worthwhile to enter the asset market or remain in it [In the specification without net worth the results are similar, but the inheritance coefficient gains significance].

When it comes to levels, Arrondel et al 2014 find that the position in the wealth and income distribution is again significantly correlated with the amount of exposure to risky financial assets, i.e. in terms of levels (overall in the euro area and in most countries). Holding risky assets is information-intensive so that there is a high correlation with high levels of education. This could reflect the permanent income effect or differences in unemployment risk (background risk). In some countries, the risky financial asset holdings

are 8-12 times higher for those with high education compared with those that have low education levels. The results for households with dependent children hold for the levels and also the results for inheritance levels.

Another aspect to look at is safe financial assets. Virtually all households own this type of asset, but when it comes to levels we do observe some trends. Households with a high position in the income and wealth distribution tend to have proportionally much larger amounts in safe assets (as well as in other assets). The level of education also has a positive effect—this may be because wealthier households are less likely to be unbanked, but they may also be more likely to save for retirement or be more likely to keep liquid assets to meet committed expenditures (e.g. children's education, mortgage payments, etc.). If the reference person is unemployed, households have significantly lower levels of safe financial assets, which could be a reflection of run-down liquid assets caused by the effort to maintain the expenditure commitments in a period characterized by reduced income inflows.

2.3 The determinants of risky asset allocations

In the household finance literature, determinants that are typically assumed to affect households' portfolio composition or investment behavior include the household structure, gender and marital status of the reference person, their age, education, their labor market situation (employment status, type of contract), the inheritance they received, as well as their resources, such as their net wealth and the quintile of the income distribution to which they belong (Guiso et al, 2002).

A more insightful discussion requires taking into account the institutional context of the country and households' background risk. Cardak and Wilkins (2009), for example, consider the case of Australia[2] and examine in more detail the effect of different sources of background risk (plus the effect of credit and liquidity constraints) on risky asset shares. They find a positive effect of homeownership (perhaps households leverage off home-ownership to diversify portfolios and raise risky financial asset holdings); a negative effect of labor risk; a positive effect of mortgage expenditures; for employed households only, a negative effect of poor health status; a positive age gradient for risky asset holdings; they did not find however any impact of business background risk. Their study also finds that households that are more risk-averse have a lower risky asset ratio, while having a longer planning horizon has a positive impact on the risky asset ratio.

In our case, considering the impact of the financial crisis, we can expect an overall increase in background risk, which would affect asset diversification.

Worthington (2009) using basic diversity measures in Australia find contrary to expectations that more risk-averse households have more concentrated portfolios. This is also the case for those with little spare financial assets, lone-parents and households with more children. Larger and older households, as well as those composed of couples and children have more diversified portfolios. Households that have a larger part of their

[2] Australia has a mandatory employer based retirement saving scheme, called 'superannuation' that operates in parallel with a longstanding pay-as-you-go pension scheme. Employer-based retirement accounts in the US are not mandatory although they are an important part of retirement savings.

income coming from wages and salaries, business interests, investments, private pensions and transfers have more diversified portfolios as well. Thus we would expect a more risk-averse person to react more strongly to a change in background risk compared to a more risk-loving household in terms of their portfolio.

Factors that impact diversification have little relation to the factors that influence the proportion of assets held in financial assets (Worthington 2009). This suggests that the requirement (in the case of Australia) to hold substantial amounts of financial assets offsets the efforts of households seeking risk-minimization through diversification.

Barasinska et al. (2012) results indicate that investors with a combination of higher risk aversion and less wealth generally have lower portfolio diversification. These investors want to avoid risk but, ironically, are exposed to excess unsystematic risk because of their under-diversification.

3. Data sources and methods

3.1 Data

The data used in this paper is the Survey of Consumer Finances. It is a tri-annual cross-sectional survey performed by the Federal Reserve Board (FRB) since 1984. In 2007, the FRB decided to have a panel component and this 2007-2009 panel is used here to trace changes in portfolio diversification. The survey consists of a core representative sample combined with a high-income supplement. The high- income supplement is selected as a list sample derived from tax data from the Internal Revenue Service (IRS). In the 2007 SCF the standard multi-stage area-probability sample contributed 2,915 cases, while the high-income supplement contributed another 1,507 cases.

The wealth components included in the survey are assets and liabilities. Total assets are the sum of non-financial assets and financial assets. Non-financial assets include : (i) owner-occupied housing; (ii) other real estate, while financial assets include: (i) bank deposits, certificates of deposit, and money market accounts; (ii) government, corporate, and other financial securities; (iii) the cash surrender value of life insurance plans; (iv) pension plans, including Individual Retirement Accounts (IRAs), Keogh, and 401(k) plans; (v) corporate stock and mutual funds; (vi) unincorporated businesses; and (vii) trust funds. Total liabilities are the sum of: (i) mortgage debt, (ii) consumer debt, including auto loans, and (iii) other debt such as educational loans.

For the purpose of this study we focus on financial assets. According to their risk categories, we classify them as safe, fairly safe and risky. **Safe** assets include transaction accounts and CDs. **Fairly safe** assets include savings bonds, cash value of whole life insurance; other managed accounts (trusts, annuities and managed investment accounts). **Risky** financial assets include: stocks, mutual funds, bonds, pension accounts (IRAs, thrift accounts and accumulated current or future pension accounts), as well as other financial account (loans to others, future proceeds, royalties, non-public stock).

When discussing assets we will either be focusing on the three categories: safe, fairly safe and risky financial assets; or on the ten underlying assets as listed above.

3.2 Variables

The regressions on the diversity of financial assets include the usual set of controls used in the household finance literature. (Their summary statistics can be found in Appendix Table A.1) These variables include age groups (less than 30, 30-40, 40-50, 50-60 and 70 and over), ; education indicators (less than high school, high school, some university and university), marital status indicators (married or not), number of children, income classes (less than 25 000 USD, between 25 000 and 50 000 USD, between 50 000 and 100 000USD and over 100 000 USD), race (Black, Hispanic, White and Other), labor market indicators (employed, self-employed, retired and out of the labor force, unemployed), occupation (managerial, sales or other) and industry (whether the household head worked in the construction industry).

Typically, net wealth is an endogenous variable by construction, but the position of a household in the wealth distribution is very important in explaining the structure of the portfolio. It is thus an important factor to control for when investigating asset diversification.[3] We address this by including wealth quintiles in the regressions.

The panel component of the data allows us to analyze the determinants of the change in diversity. We ten control for whether, during the period examined, the head of the household got divorced or married, had children, lost his/her job or whether his/her health deteriorated. The first two are calculated based on whether there was a change in the marital status from married to divorced and from not married to married, respectively. Next, having children was based on whether the household had a change in the number of children from 0 to 1; losing one's job was determined by whether the household head become unemployed; finally the change in health status was determined by whether self-reported health in 2009 was worse than in 2007.

3.3 Empirical Strategy

In the section that follows, we first elaborate on the concept of diversity of asset holdings both at the population level and at the individual level. Once, the diversity measures are defined we compare the measures in 2007 and 2009 at different levels of aggregation.

Next, we focus on the determinants of individual asset diversification. We pool the data for 2007 and 2009 assuming the effect of covariates do not change over time and we estimate the following equation:

$$\mathrm{d_i} = X_i + year + \varepsilon_i \quad , \qquad (1)$$

where $\mathrm{d_i}$ is the diversity measure; X_i is a vector of socio-demographic and monetary variables as specified in section 3.2 and $\varepsilon_i$is the error term; $year$ is a dummy variable equal to 1 in 2009. This specification allows us to focus on the driving forces of diversification and to see whether the results for the US differ from those found in the literature.

[3] When addressing wealth endogeneity, the literature sometimes drops this control or the specific type of asset that is modeled is excluded and the remaining "aggregate wealth" distribution is used.

Subsequently, using the panel component of the data, we check whether, as a result of a change in background risk people, modified their diversification strategy, i.e. whether they decided to wait or rebalance their portfolio.

We do so by estimating, which lifetime changes over the 2007 -2009 period had the biggest impact on the change in asset diversification.

$$\Delta \mathrm{d_i} = X_i + events + year + \varepsilon_i \qquad (2)$$

$\Delta \mathrm{d_i}$ is the change in the diversity measure calculated as the change from 2007 to 2009. In the regression, as explanatory variables we focus on such $events$ as getting divorced or getting married, having children, losing one's job or deterioration in one's health status, which may have lead to precautionary savings and behavior geared at avoiding risk (Cordak & Wilkins, 2009).

After presenting the various diversification measures, we will first examine the determinants of diversification in the context of the United States and then check the sources of changes in diversification during the Great Recession.

4. Measuring the diversity of assets holdings

4.1. On the notion of diversity[4]

A diversity index, which is a concept commonly used in ecology, is a measure that is a function of the number of different types (or "species" in ecology) in the population, but it also takes into account how evenly individuals are distributed among those types. More precisely a diversity index will increase with the number of types as well as with the degree of evenness. In fact for a given number of types, the highest diversity value will be observed when all types are equally abundant.

4.2. Applying the concept of diversity to asset holdings

Let us now assume that the types refer to the different kinds of assets and the individuals to dollars. For a given number of assets, diversity would then measure how evenly the dollars are allocated between the different types of assets. Such diversity may be measured for the population as a whole or at the level of the individual (or household). Another interesting distinction, at least when measuring the diversity of asset holdings at the individual level, concerns the "a priori" distribution of total asset holdings between the various assets. Shall we assume that evenness refers to a situation where the different types of assets are equally abundant, that is, to the case where the dollars are equally allocated between the various kinds of assets? Or shall we postulate that for an individual the weight of the different types of assets should "a priori" be that observed in the population as a

[4] For more details on the concepts of diversity and diversity index, see https://en.wikipedia.org/wiki/Diversity_index

whole? Depending on the hypothesis selected, one will evidently end up with different measures of diversity.

4.3. Indices measuring the diversity of asset holdings in the population as a whole

In what follows, we will focus on the diversity of financial assets. Let s_k be the share in the total amount of financial assets held in the population in the form of asset *k*. This share s_k may be considered as a measure of the relative "abundance" of asset k. The weighted generalized mean s_E of order $(r-1)$ of these *K* shares, assuming the weight of each share s_k is equal to the share s_k itself, will then be defined by the relation

$$\sum_{k=1}^{K} s_k (s_E)^{(r-1)} = \sum_{k=1}^{K} s_k (s_k)^{(r-1)} \quad (1)$$

Since $\sum_{k=1}^{K} s_k = 1$, we end up with

$$s_E = \left(\sum_{k=1}^{K} s_k (s_k)^{(r-1)}\right)^{\frac{1}{(r-1)}} = \left[\sum_{k=1}^{K} s_k^r\right]^{\left(\frac{1}{r-1}\right)} \quad (2)$$

The inverse D of this generalized mean will be expressed as

$$D == \frac{1}{s_E} = \left[\sum_{k=1}^{K} s_k^r\right]^{\left(\frac{1}{1-r}\right)} \quad (3)$$

It may be considered as being equal to the number of equally "abundant" types of assets needed for the average proportional "abundance" of these assets to be identical to that actually observed in the data, where all types of assets are not equally "abundant"[5]. It should be clear that this measure D measures in a way the diversity of the asset holdings.

Assume, for example, that the shares of all the assets are equal so that $s_k = (\frac{1}{K}) \ \forall k$. The diversity index will then be written as $D = \left[K\left(\frac{1}{K}\right)^r\right]^{\left(\frac{1}{1-r}\right)} = \left[\left(\frac{1}{K}\right)^{r-1}\right]^{\frac{1}{1-r}} = K$, the highest value for the diversity index.

On the other hand when all the asset shares but one are equal to 0 while that of, say, asset h is equal to 1, the diversity index will be expressed as $D = [1^r + 0 \ldots + 0]^{\frac{1}{1-r}} = 1$, the lowest value for the diversity index.

Note that when r = 1, expression (2) is not defined. We can however compute the mathematical limit of expression (2) when $r \to 1$ which is[6]

$$D' = e^{-\sum_{k=1}^{K} s_k ln s_k} \quad (4)$$

It may be observed that D' is equal to the exponential of Shanon's entropy[7] (see, Theil, 1967).

The parameter r indicates how sensitive the diversity measure will be to the relative "abundance" of the various assets. Note that when, r = 0 the generalized mean s_E is equal to the weighted harmonic mean of the shares s_k. As mentioned previously, when r = 1, the generalized mean s_E becomes equal to the weighted geometric mean of the shares s_k. Finally, when $r = 2$, the generalized mean s_E becomes equal to the weighted arithmetic mean of the shares s_k.. More generally, the higher r, the greater the weight given to the "abundant" assets, the higher s_E and as a consequence the lower the diversity D. When $r \to \infty$, the weighted generalized mean s_E tends towards the highest value of the shares s_k. In fact, when r > 1, a greater weight is given to "abundant" assets while when $r < 1$ a greater weight is given to "non-abundant" assets. Finally note that when r = 0, the weights of the

[5] The parallelism between p_E and Atkinson's (1970) concept of "equally distributed equivalent level of income" (which Kolm, 1969, had called "equal equivalent") in the literature on income inequality measurement should be evident.

[6] Atkinson (1970) mentions also this limit when defining the "equally distributed equivalent level of income".

[7] But D' is computed using natural logarithms rather than logarithms of base 2.

assets compensate their relative "abundance" so that the generalized mean s_E will be equal to $(\frac{1}{K})$ even though the assets may not be equally "abundant". In such a case the diversity measure D will become identical to the actual number of assets (K). In what follows we will assume that r is non negative because otherwise "non abundant" assets would be given a much greater weight than "abundant" assets and the diversity measure D would exceed the actual number K of assets.

4.4 The Gini-Simpson diversity index

Let us assume in (2) that $r = 2$. We then derive that $s_E = \sum_{k=1}^{K}(s_k)^2 = \sum_{k=1}^{K} s_k(s_k)$ so that s_E is equal to the weighted arithmetic mean of the asset shares, the weights being themselves identical to these shares. In such a case s_E may be interpreted as the probability that two dollars drawn at random with repetition belong to the same type of asset. The transformed measure

$$D_{G-S} = (1 - s_E) = 1 - \sum_{k=1}^{K}(s_k)^2 = \sum_{k=1}^{K} s_k(1 - s_k) \quad (5)$$

is known as the Gini-Simpson index (see, Gini, 1912, and Simpson, 1949). It gives then the probability that two dollars drawn randomly with repetition belong to two different types of assets. Expression (5) may evidently be applied to the assets of individuals or to those of the population as a whole.

Note that the Gini-Simpson index is in fact the complement to 1 of the famous Herfindahl-Hirschman (see, Hirschman, 1945, and Herfindahl, 1950) index H where

$$H = \sum_{k=1}^{K} s_k^2 \quad (6)$$

We observe that H is equal to 1 if one spends everything on one category and tends towards zero when all categories have the same weight $(1/K)$ and the number of categories K is very high $(K \to \infty)$. Combining (5) and (6) we observe that the Herfindahl-Hirschman index H is in fact equal to the generalized mean s_E when the parameter r is equal to 2. The inverse of H would then give us the number of equally "abundant" types of assets[8] in the case where $r = 2$.

4.5. Defining the Gini-Simpson index of the diversity of assets holdings at the individual level

Whereas the diversity indices mentioned hitherto were defined at the population level in the sense that these indices allowed us to compute the diversity of asset holdings in the whole population, it is also possible to compute such a diversity at the individual level. Let s_{jk} refer to the share of asset k held by individual j in the total assets of the population and let $s_{j.}$ represent the share of individual j (all assets combined) in the total assets of the population. Using (5) the Gini-Simpson diversity index for individual j would then be expressed as

[8] Stigler (1964) had already mentioned that the inverse of the Herfindahl index of the concentration of firms gives the number of equivalent firms.

$$D_{Hj} = 1 - \sum_{k=1}^{K} \left(\frac{s_{jk}}{s_{j.}}\right)^2 \quad (7)$$

The overall level of individual diversity would then be the weighted average of the individual diversity indices D_{Hj} and written as

$$D_{H,ind} = \sum_{j=1}^{n} s_{j.} D_{Hj} = 1 - \sum_{j=1}^{n} s_{j.} \sum_{k=1}^{K} \left(\frac{s_{jk}}{s_{j.}}\right)^2 \quad (8)$$

4.6. Alternative measures of the diversity of assets holdings at the individual level

We can also apply expression (2) at the individual level and define the generalized mean of asset holds for individual *j* as

$$s_{E,j} = \left(\sum_{k=1}^{K} \left(\frac{s_{jk}}{s_{j.}}\right)\left(\frac{s_{jk}}{s_{j.}}\right)^{(r-1)}\right)^{\frac{1}{(r-1)}} \quad (9)$$

The corresponding diversity index for individual j would then be expressed as

$$D_j = \left[1 \Big/ \left(\sum_{k=1}^{K} \left(\frac{s_{jk}}{s_{j.}}\right)\left(\frac{s_{jk}}{s_{j.}}\right)^{(r-1)}\right)^{\frac{1}{(r-1)}}\right] \quad (10)$$

The overall measure of diversity at the individual level would then be defined as

$$D_{within\ individuals} = \sum_{j=1}^{n} s_{j.} D_j \quad (11)$$

Of particular interest is the case where $r = 1$, in which case, as mentioned previously, the individual diversity measure would be derived from the concept of entropy and be expressed as

$$D'_j = e^{-\sum_{k=1}^{K}\left(\frac{s_{jk}}{s_{j.}}\right) ln\left(\frac{s_{jk}}{s_{j.}}\right)} \quad (12)$$

The corresponding overall measure of "within individuals" diversity would then be

$$D'_{within\ individuals} = \sum_{j=1}^{n} s_j D'_j \quad (13)$$

4.7. Measuring the diversity between individual asset holdings

Rather than measuring the diversity of an individual's asset holdings, we can compare the structure of his/her asset holdings with that of another individual and define a "between individuals" measure of individual asset holdings. We would then follow Lieberson (1964; 1969) who extended the Gini-Simpson concept of population diversity to the case of two populations.

Calling respectively $\left(\frac{s_{jk}}{s_{j.}}\right)$ and $\left(\frac{s_{hk}}{s_{h.}}\right)$ the share of asset *k* in the holdings of individuals *j* and *h*, and assuming we randomly draw a dollar from each of the two populations, the probability that these two dollars will come from different assets may be considered as a measure of the diversity of asset holdings between the two individuals *j* and *h* and expressed as

$$D_{j\ and\ h} = \sum_{k=1}^{K} \left(\frac{s_{jk}}{s_{j.}}\right)\left(1 - \left(\frac{s_{hk}}{s_{h.}}\right)\right) = \sum_{k=1}^{K} \left(\frac{s_{hk}}{s_{h.}}\right)\left(1 - \left(\frac{s_{jk}}{s_{j.}}\right)\right) \quad (14)$$

Rather than comparing the diversity of asset holdings of two individuals, we can compare the diversity of asset holdings of, say, individual, with that of the whole population. In such a case we would define an index $D_{i,population}$ as

$$D_{i,population} = \sum_{k=1}^{K} \left(\frac{s_{ik}}{s_{i.}}\right)(1 - s_{.k}) \quad (15)$$

where, as previously, $s_{.k}$ refers to the share of asset *k* in the whole population. The index $D_{i,population}$ indicates therefore how different the diversity of the asset holdings of individual i is from that in the whole population.

5. Looking at the diversity of asset holdings in 2007 and 2009

5.1 Distribution of Assets in 2007-2009

First, we will look at the distribution of assets in 2007 and 2009. We will focus on the three main assets safe, fairly safe and risky financial assets and then we will discuss them in more detailed by taking into account the 10 underlying categories.

Table 1: Share of the various assets in 2007 and 2009 (3857 observations)

Type of Asset	2007	2009
All the Assets	**100%**	**100%**
Safe Assets	**8.6%**	**13.9%**
Transaction accounts (liquid assets)	7.4%	11.6%
CDs	1.2%	2.2%
Fairly Safe Financial Assets	**8.6%**	**13.2%**
Savings Bonds	0.07%	0.1%
Cash Value of Life Insurance	1.3%	2.1%
Other Managed Accounts	7.1%	11.0%
Risky Assets	**82.8%**	**72.9%**
Mutual Funds	24.4%	15.0%
Stocks	36.8%	31.5%
Other Bonds	11.8%	15.6%
Quasi Liquid Pension Accounts	7.5%	7.3%
Other Financial Assets	2.3%	3.5%

Table 1 indicates that the majority of financial assets at the population level are held in the form of risky assets. The rest are distributed among safe and fairly safe in more or less the same proportion. From 2007 to 2009 the share of assets held in risky assets diminished by about 10 percentage points. This could be due to a decline in either valuation or ownership. Table A.1 which presents ownership rates indicates that there was no significant change in ownership rates of safe, fairly safe and risky assets, which leads us to believe that valuation played the key role.

Looking at the share of various assets in more detail by focusing on the 10 underlying assets, we observe that the increase in the share of assets was due to an increase in the share of assets held in transaction accounts (ownership rates did not change). There is also a slight increases in the share of assets held as CDs and here we do see an increase in ownership rates.

In terms of the fairly safe assets, we also observe an increase in the share of assets held in life insurance and other managed accounts. There are no significant changes in the ownership rates here (Table A.1). The share of assets held in risky assets decreased from 2007 to 2009. This refers to stocks and mutual funds, mostly. The share increased in other type of bonds and other financial assets. The ownership table also indicates that over time there is a statistically significant drop in ownership rates in mutual funds, but not stocks. Ownership of other bonds and other financial assets also exhibits a statistically significant increase.

So overall, we do see some changes in the composition of the portfolio between 2007 and 2009. There is a drop in the share and ownership of mutual funds and in the share of stocks and an increase in the shares and ownership of other bonds and other financial assets.

5.2 Diversity of Assets in 2007-2009

In what follows we will measure diversity using the indices defined in the previous section in the population as a whole and at the individual level. Next, we will examine the correlation among the different diversity indices.

Diversity in the population as a whole

In Tables 2 we will focus on diversity measures in the population as a whole in 2007 and 2009. We will do so within each asset group (safe (2 assets), fairly safe (3 assets) and risky (5 assets)), as well as for all the assets in the detailed classification and finaly for the aggregated assets with three groups. Starting in column (4) we have the results of the diversity indices defined in section 4.3 and 4.4 for different values of *r, r* being a measure of the sensitivity of the diversity measure to the relative "abundance" of the various assets. Thus, the higher *r*, the greater the weight given to the "abundant" asset, the higher the generalized mean s_E and the lower the diversity measure *D.* In each cell, below the diversity measure, we can find the jack-knife confidence interval.

First, we find that within all categories (safe, fairly safe and risky), diversity increased and the increase is statistically significant. We also find this to be the case, for the 10 assets detailed categories and the three aggregated asset categories.

Table 2: Measures of the Diversity of Assets in the population as a whole in 2007 and 2009[9]

Type of Assets Covered and Year	Number of Obser-vations	Gini-Simpson Diversity Index	Diversity Index defined as inverse of generalized mean with $r = 0$	Diversity Index defined as inverse of generalized mean with $r \to 1$ ($r = 0.999$)	Diversity Index defined as inverse of generalized mean with $r = 2$	Diversity Index defined as inverse of generalized mean with $r = 10$
Safe Assets						
2007	2	0.243188 (0.243119, 0.243295)	2	1.50406 (1.50393 1.50426)	1.32133 (1.32121 1.32152)	1.18499 (1.18491 1.1851)
2009	2	0.270091 (0.270016, 0.270162)	2	1.55492 (1.55478 1.55506)	1.37003 (1.36989 1.37017)	1.21529 (1.2152 1.21538)
Fairly Safe Assets						
2007	3	0.278269 (0.278149, 0.278276)	3	1.6157 (1.61543 1.6157)	1.38556 (1.38533 1.38557)	1.22218 (1.22203 1.22219)
2009	3	0.284898 (0.284819, 0.284906)	3	1.63999 (1.6398 1.64001)	1.39840 (1.39825 1.39842)	1.22923 (1.22914 1.22924)
Risky Assets						
2007	5	0.686328 (0.686267, 0.686344)	5	3.72609 (3.72562 3.7263)	3.18805 (3.18742 3.1882)	2.45554 (2.45485 2.45576)
2009	5	0.712628 (0.712558, 0.712639)	5	4.02953 (4.02899 4.02964)	3.47981 (3.47897 3.47994)	2.5377 (2.53695 2.53788)
All the Assets (Detailed classification)						
2007	10	0.773858 (0.773799, 0.77387)	10	5.71625 (5.71514 5.7166)	4.42200 (4.42085 4.42223)	3.02685 (3.02582 3.02706)
2009	10	0.820671 (0.820624, 0.820681)	10	6.78384 (6.78292 6.78414)	5.57634 (5.57488 5.57666)	3.60431 (3.60293 3.60457)
Aggregated Assets						
2007	3	0.299028 (0.298965, 0.299115)	3	1.78197 (1.7818 1.78221)	1.42659 (1.42646 1.42677)	1.23266 (1.23259 1.23276)
2009	3	0.431564 (0.43152, 0.431662)	3	2.16395 (2.16381 2.16425)	1.75921 (1.75908 1.75952)	1.42032 (1.42023 1.42049)

[9] Confidence intervals (5%-95%) based on the jackknife resampling approach are given in parentheses.

Table 3: Various Measures of the weighted average of the individual diversity of Assets in 2007 and 2009[10]

Type of Assets Covered and Year	Gini-Simpson Diversity Index	Diversity Index defined as inverse of generalized mean with $r = 0$	Diversity Index defined as inverse of generalized mean with $r \to 1$ ($r = 0.999$)	Diversity Index defined as inverse of generalized mean with $r = 2$	Diversity Index defined as inverse of generalized mean with $r = 10$
Number of observations	**3857**	**3857**	**3857**	**3857**	**3857**
Safe Assets					
2007	0.0579529 (0.0579172, 0.0579801)	2	1.11972 (1.11964 1.11978)	1.09492 (1.09486 1.09497)	1.07056 (1.07052 1.0706)
2009	0.0875663 (0.087517, 0.0875932)	2	1.18044 (1.18034 1.18049)	1.14646 (1.14639 1.14651)	1.11114 (1.11109 1.11118)
Fairly Safe Assets					
2007	0.058211 (0.0582076, 0.0582207)	3	1.12498 (1.12492 1.12508)	1.093337 (1.093332 1.093354)	1.06485 (1.06482 1.0649)
2009	0.0688313 (0.0688298, 0.0688404)	3	1.14463 (1.14458 1.14472)	1.1076045 (1.107603 1 .1076202)	1.07451 (1.0745 1.07458)
Risky Assets					
2007	0.369349 (0.369283, 0.369383)	5	2.01145 (2.01118 2.01165)	1.783271(1.783125 1.7833841)	1.55578 (1.55558 1.55596)
2009	0.398417 (0.398341, 0.398447)	5	2.16147 (2.1611 2.16168)	1.90656 (1.90640 1.90669)	1.63986 (1.63963 1.64003)

[10] Confidence intervals (5%-95%) based on the jackknife resampling approach are given in parentheses.

Table 3 (cont.)

Type of Assets Covered and Year	Gini-Simpson Diversity Index	Diversity Index defined as inverse of generalized mean with $r = 0$	Diversity Index defined as inverse of generalized mean with $r \to 1$ ($r = 0.999$)	Diversity Index defined as inverse of generalized mean with $r = 2$	Diversity Index defined as inverse of generalized mean with $r = 10$
All the Assets (Ten Categories)					
2007	0.463014 (0.46294, 0.463038)	10	2.56201 (2.5617 2.5622)	2.16153 (2.16128 2.16169)	1.79265 (1.79245 1.79281)
2009	0.496903 (0.496831, 0.496922)	10	2.73501 (2.73466 2.73517)	2.29438 (2.29412 2.29452)	1.87747 (1.87728 1.8776)
Aggregated Assets (Three Categories)					
2007	0.18791 (0.18786, 0.18795)	3	1.44198 (1.44185 1.44208)	1.31739 (1.31729 1.3175)	1.22387 (1.2238 1.22396)
2009	0.23594 (0.23588, 0.23598)	3	1.53738 (1.53725 1.53748)	1.39968 (1.39958 1.39979)	1.28056 (1.28049 1.28066)

Diversity at the individual level

Next, we focus on diversity measured as the weighted average of the individual diversity of assets (see, Table 3). Here also these weighted individual diversity indices are computed first separately for the safe, fairly safe and risky assets and then by including all assets, either at the aggregated level (three types of assets) or when taking into account ten different financial assets. It then appears that diversity measured at the individual level also increased between 2007 and 2009, within assets (safe, fairly safe and risky), for all ten asset categories as well as at the aggregated level (three categories).

Correlations across diversity indices

Next, we perform a series of correlations between the value of individual diversities in 2007 and in 2009 and between selected individual diversity indices in a given year for the various assets. These results can be found in Tables 4-6.

Table 4 presents the correlation for three types of diversity measures between their value in 2007 and in 2009 for ten assets and the three aggregated assets. The results indicate that there is a positive correlation between the two years, but it is not extremely high (in the 0.4 to 0.61 range). For the Gini-Simpson and Lieberson diversity indices a higher correlation is observed with the three aggregated assets while for the other indices defined as the generalized mean (with $\boldsymbol{r = 2}$ and $\boldsymbol{r = 10}$), the correlation is higher when calculated for ten assets.

Table 4: Correlations between individual diversities in 2007 and their values in 2009.[11]

Diversity index used	Ten Assets	Three Aggregated Assets
Gini-Simpson Diversity Index	**0.513**	**0.543**
Diversity Index defined as inverse of generalized mean with $r = 2$	**0.613**	**0.493**
Diversity Index defined as inverse of generalized mean with $r = 10$	**0.529**	**0.401**
Lieberson diversity index	**0.460**	**0.504**

When comparing individual diversities for different asset groups for a given year (see, Table 5 and 6), we find that there is a very high correlation between the Gini-Simpson and Lieberson index in both years (more than 0.9) -- increasing in 2009. The correlation is of similar magnitude for the indices defined as the generalized mean (with $\boldsymbol{r = 2}$ and $\boldsymbol{r = 10}$) in the case of ten assets. The correlation between the Gini-Simpson and Lieberson index is no longer this high (in the 0.3 and 0.4 range) for three assets (Table 6), while it remains high for the indices defined as the generalized mean (with $\boldsymbol{r = 2}$ and $\boldsymbol{r = 10}$) in the case of three assets.

The rest of the correlation among the indices are much lower (in the 0.3 and 0.5 range). The lowest one is between the Lieberson index and the diversity index defined as the generalized mean (with $\boldsymbol{r = 10}$) defined for ten assets. Its correlation remains the

[11] The correlation could not be computed in the case where $r \to 1$.

Table 5: Correlations between the individual diversity indices in a given year (separately for 2007 and 2009) in the case of ten assets.

Indices compared	2007	2009
Gini-Simpson and Diversity Index defined as inverse of generalized mean with $r = 2$	0.503	0.485
Gini-Simpson and Diversity Index defined as inverse of generalized mean with $r = 10$	0.365	0.356
Gini-Simpson and Lieberson index	0.908	0.947
Diversity Index defined as inverse of generalized mean with $r = 2$ and Diversity Index defined as inverse of generalized mean with $r = 10$	0.968	0.970
Diversity Index defined as inverse of generalized mean with $r = 2$ and Lieberson index	0.270	0.306
Diversity Index defined as inverse of generalized mean with $r = 10$ and Lieberson index	0.143	0.184

lowest when the three aggregated assets are used. The correlation between the Gini-Simpson and diversity indices defined as the inverse of the generalized mean decreases with the number of assets.

Table 6: Correlations between individual diversity indices in a given year (done separately for 2007 and 2009) in the case of three aggregated assets.

Indices compared	2007	2009
Gini-Simpson and Diversity Index defined as inverse of generalized mean with $r = 2$	**0.758**	**0.758**
Gini-Simpson and Diversity Index defined as inverse of generalized mean with $r = 10$	**0.568**	**0.575**
Gini-Simpson and Lieberson index	**0.295**	**0.382**
Diversity Index defined as inverse of generalized mean with $r = 2$ and Diversity Index defined as inverse of generalized mean with $r = 10$	**0.952**	**0.954**
Diversity Index defined as inverse of generalized mean with $r = 2$ and Lieberson index	**0.192**	**0.230**
Diversity Index defined as inverse of generalized mean with $r = 10$ and Lieberson index	**0.152**	**0.171**

6. Looking at the determinants of individual diversity:

Having calculated the diversity measures, next we focus on the determinants of individual diversity. We pool the data for 2007 and 2009 assuming the effect of covariates does not change over time and we include a yearly indicator. We perform this for all diversity indices. The results for the Gini-Simpson index are in Table 7, while the results for other diversity indices are located in the in the Appendix in Tables A.2 and A.3. Here, we include several specifications of equation (1). In the first one, we control for age, education and marital status; then we include income, then race, then wealth quintiles, labor market status and occupations. The last specification includes all the explanatory variables.

Explanatory factors

Demographic variables: Looking at the determinants of diversification (see, Table 7), we observe that diversification increases with age and the increase is the highest for the age group 70 years of age and older. Diversity also increases with the education level. Marital status has a statistical significant positive effect on the measure of diversity. Having

children has a statistically significant negative effect on the diversity of assets, albeit small. This result could be related to increased expenses related to child-raising.

These results are robust to the inclusion of income and wealth. The inclusion of income has a stronger effect on the effect of education and being married. The inclusion of wealth has a stronger effect on the impact of age on diversification. The oldest group is usually the wealthiest one.

Income and wealth: Diversification increases with income, except for the highest income category (having over 100 000 USD), where it slightly declines. Being in the lowest two quintiles of wealth coincides with a decrease in diversification compared to the middle wealth quintiles and this is robust to the inclusion of income. It makes no difference if you have median wealth or higher when examining diversification.

Race: Being non-white has a statistically significant negative effect on diversification. This effect is irrespective of whether we control for income or wealth, or not.

Labor market: Occupation and labor market variables play an important role in explaining diversification. Being retired (but this category also includes disabled, homemakers and others not working) has the highest association with diversification compared to those out of the labor force. When it comes to occupations, managers exhibit the highest diversification.

Industry: Having been in the construction industry, which was the worst hit industry during the Great Recession, does not seem to have a separate impact on the diversity indices.

Thus, we find that older, wealthier and better educated individuals diversify their portfolio more.

Table 7: The determinants of individual diversity (Gini-Simpson).

	(1)	(2)	(3)	(4)	(5)	(6)
Age 30-40	0.33***	0.1	0.09	-0.04	0.06	-0.14
	-3.69	-1.14	-0.99	(-0.41)	-0.69	(-1.62)
Age 40-50	0.54***	0.31***	0.25***	-0.06	0.21**	-0.13
	-6.37	-3.7	-2.99	(-0.68)	-2.48	(-1.55)
Age 50-60	0.70***	0.48***	0.41***	0.01	0.36***	-0.03
	-8.36	-5.81	-4.96	-0.07	-4.33	(-0.38)
Age 60-70	0.74***	0.57***	0.47***	0.01	0.40***	-0.03
	-8.38	-6.61	-5.48	-0.14	-4.34	(-0.29)
Age 70+	1.04***	0.89***	0.75***	0.23**	0.66***	0.18*
	-11.45	-9.97	-8.41	-2.4	-6.56	-1.7
High school	1.17***	0.87***	0.75***	0.90***	0.74***	0.64***
	-15.38	-11.54	-9.91	-12.23	-9.77	-8.55
Some University studies	1.61***	1.18***	1.06***	1.24***	1.03***	0.90***
	-19.45	-14.24	-12.71	-15.31	-12.3	-10.92
University degree	1.74***	1.21***	1.06***	1.25***	0.97***	0.81***

	-24.17	-15.71	-13.55	-16.62	-12.01	-10.17
Married	0.53***	0.18***	0.15***	0.25***	0.16***	0.09*
	-12.06	-3.87	-3.17	-5.55	-3.32	-1.86
Kids	-0.05**	-0.04**	-0.02	-0.03*	-0.02	-0.01
	(-2.49)	(-2.09)	(-1.03)	(-1.69)	(-0.97)	(-0.59)
year	0.01	0.02	0.02	0.04**	0.02	0.05**
	-0.46	-1.03	-1.06	-2.35	-1.29	-2.52
10000≤INCOME<25000		0.62***	0.63***		0.63***	0.56***
		-6.1	-6.23		-6.25	-5.61
25000≤INCOME<50000		1.45***	1.43***		1.43***	1.20***
		-14.9	-14.79		-14.62	-12.47
50000≤INCOME<100000		1.77***	1.70***		1.70***	1.32***
		-17.9	-17.27		-16.92	-13.15
INCOME≥100000		1.70***	1.59***		1.52***	1.14***
		-17.03	-15.97		-14.95	-11.04
Black			-0.70***		-0.68***	-0.48***
			(-10.15)		(-9.81)	(-6.98)
Hispanic			-0.76***		-0.76***	-0.67***
			(-9.38)		(-9.36)	(-8.44)
Other race			0.03		0.01	-0.01
			-0.32		-0.06	(-0.10)
First wealth quintile				-1.68***		-1.33***
				(-22.38)		(-17.51)
Second wealth quintile				-0.39***		-0.26***
				(-5.32)		(-3.66)
Fourth wealth quintile				0.04		-0.04
				-0.61		(-0.57)
Fifth wealth quintile				0.01		-0.07
				-0.08		(-0.96)
Employee					0.27**	0.17
					-2.48	-1.59
Self-employed					0.30**	0.16
					-2.57	-1.37
Not working					0.52***	0.42***
					-4.94	-4.08
Managerial					0.34***	0.34***
					-4.88	-4.98
Sales					0.23***	0.24***
					-3.07	-3.31
Construction					0.08	0.05
					-1.39	-0.83
Constant	-1.38***	-2.80***	-2.49***	-0.80***	-2.89***	-2.06***
	(-7.16)	(-13.55)	(-12.05)	(-4.16)	(-12.92)	(-9.08)
R-square	0.13	0.18	0.2	0.2	0.2	0.24
Number of observations	7714	7714	7714	7714	7714	7714

Notes: For each explanatory variable, the first line gives the value of the regression coefficient, the second the t-value. Significance: * at 10%; ** at 5%; *** at 1%

The excluded categories are: age less than 30; education less than high school; race is white; not in the labor force; other occupations; income less than 10 000 USD and third wealth quintile.

7. Looking at the change in individual diversity between 2007 and 2009

Apart from investigating the determinants of diversification, we elaborate on the determinants of a change in diversity. To this end, we estimate the change in diversity measures (as outlined in equation (2)) on the same set of covariates as before. In addition, we include a set of change variables that could possibly have an impact on portfolio diversification. Having two data points at hand we are able to define variables that indicate whether the households experience a change in marital status (got divorced or got married); whether the household head had children or stopped working; whether the household head observed health deterioration. The results for the Gini-Simpson index can be found in Table 8, while the results for the other indices are in the Appendix Table A.3.

Here, we also observe very interesting results.

Demographic variables: Thus, we see that the change in diversity has been significantly smaller for those with a university degree compared to those that have an education level of less than high school according to the Gini-Simpson index of diversity. This could be expected given the well-known higher financial literacy among those with a higher educational degree. Being married does not have a statistically significant effect, but once we control for a change in marital status being married has a positive effect on the change in diversity. Becoming married over this period has a positive impact on the change in diversity. Getting a divorce, on the other hand, decreased the diversity of one's assets—this result is confirmed regardless of the index used to measure diversity. This can be explained by the additional loss in assets due to divorce and thus loss in the ability to diversify them.

Labor market: When it comes to labor market variables, being an employee has a positive effect on the change in diversity over the 2007 – 2009 period. If the head of the household stopped working over this time period this seems to have a negative impact on the diversity measure, while being in worse health has a positive effect. Being an employee also has a positive effect on the change of the diversity index compared to those who are retired or out of the labor force. This seems also to be generally true for the self-employed, although the results are not robust in all the specifications.

Race: When it comes to race, we find that compared to whites, being Black or Hispanic had a positive effect on the change of the diversity of the portfolio between 2007 and 2009.

Income and wealth: Controlling for the wealth quintile indicates that being in the bottom quintile has a negative effect on the change in the index compared to those in the middle quintile, which could just be to low levels of wealth to begin with and little possibility to diversify in the first place. For the other quintiles the results are not significant. Including income brackets in the regression does not seem to have a robust effect in this regression.

Thus, overall we find that the whether or not there was a change in the diversity measure depends on education, whether there are children present, race, and the labor market

situation. Whether a life-situation change occurred during this time such as getting divorced, or married or losing one's job and having deteriorating health are all significant factors impacting changes in diversification. Having children in general is a significant determinant of a changing diversity index during this time, but not necessarily having it during this period.

Table 8: The determinants of the change in individual diversity between 2007 and 2009 (Gini-Simpson).

	(1)	(2)	(3)	(4)	(5)	(6)
Age 30-40	0.02	0	-0.01	0.03	0.01	-0.01
	-0.13	-0.01	(-0.04)	-0.2	-0.03	(-0.10)
Age 40-50	-0.07	-0.09	-0.12	-0.03	-0.08	-0.14
	(-0.52)	(-0.65)	(-0.57)	(-0.24)	(-0.56)	(-0.95)
Age 50-60	0.13	0.12	0.1	0.2	0.16	0.08
	-0.95	-0.84	-0.47	-1.45	-1.13	-0.59
Age 60-70	0.04	0.03	0.03	0.18	0.14	0.05
	-0.26	-0.21	-0.16	-1.27	-0.93	-0.33
Age 70+	0.06	0.05	0.03	0.30*	0.19	0.09
	-0.43	-0.36	-0.14	-1.94	-1.21	-0.54
High school	-0.27**	-0.31***	-0.33	-0.25**	-0.29**	-0.31***
	(-2.36)	(-2.67)	(-1.59)	(-2.13)	(-2.46)	(-2.66)
Some University	-0.15	-0.2	-0.23	-0.13	-0.19	-0.23*
	(-1.20)	(-1.56)	(-1.12)	(-1.06)	(-1.47)	(-1.74)
University	-0.21**	-0.27**	-0.3	-0.19*	-0.25**	-0.29**
	(-1.97)	(-2.31)	(-1.55)	(-1.71)	(-2.03)	(-2.36)
Married in 2009	-0.05	-0.09	-0.21***	-0.06	-0.21***	-0.22***
	(-0.81)	(-1.28)	(-2.65)	(-0.96)	(-2.70)	(-2.88)
Children	0.06**	0.06**	0.06*	0.05*	0.06**	0.06**
	-1.97	-1.97	-1.81	-1.8	-1.98	-1.98
10000≤INCOME<25000		0.15	0.15		0.13	0.13
		-1.02	-0.52		-0.86	-0.87
25000≤INCOME<50000		0.30**	0.3		0.26*	0.24*
		-2.13	-1.24		-1.84	-1.66
50000≤INCOME<100000		0.26*	0.26		0.23	0.19
		-1.85	-1.18		-1.61	-1.25
INCOME≥100000		0.28**	0.3		0.28*	0.21
		-1.98	-1.39		-1.96	-1.41
got_divorced			-0.50**		-0.51***	-0.51***
			(-2.55)		(-3.98)	(-3.99)
got_married			0.46*		0.45**	0.46**
			-1.83		-2.14	-2.21
Stopped working			-0.34***		-0.23*	-0.23*
			(-2.58)		(-1.84)	(-1.85)
Health became worse			0.41		0.45*	0.44*
			-0.93		-1.78	-1.78
had_children			0.06		0.06	0.08
			-0.39		-0.46	-0.57
Black				0.17	0.19*	0.23**
				-1.61	-1.74	-2.12
Hispanic				0.28**	0.30**	0.32**
				-2.22	-2.37	-2.51
Other race				0.02	0.01	0.01
				-0.15	-0.04	-0.07
employee				0.30***	0.18*	0.17*

				-3.69	-1.79	-1.76
Self-employed				0.19**	0.1	0.07
				-2.13	-0.94	-0.63
First wealth quintile						-0.23*
						(-1.95)
Second wealth quintile						0.09
						-0.8
Fourth wealth quintile						0.01
						-0.13
Fifth wealth quintile						0.1
						-0.93
Constant	0.17	0.01	0.16	-0.15	-0.08	0.05
	-1.12	-0.05	-0.44	(-0.86)	(-0.39)	-0.21
R-square	0	0.01	0.01	0.01	0.02	0.02
Number of observations	3857	3857	3857	3857	3857	3857

8. Summary and Conclusions

In this paper, we focus on the diversification of assets by defining diversity measures traditionally used in biology and sociology. Given a fixed number of assets, we measure how evenly the dollars are distributed between different types of assets. In this way, we tap into the discussion on the equality of distribution of assets. The higher the diversity the more equally abundant each type is.

We examine what happens to diversity over time in the United States and whether there have been significant changes in portfolio diversification during the financial crisis. We also want to identify whether changes in background risk during this time has an impact on diversification.

We define several diversity indices: at the population level, at the individual level and we compare individual level diversity with that of the population. In all specification, we show that diversity has increased from 2007 to 2009. We show this for safe, fairly safe and risky assets, for the three assets and all ten in the detailed analysis. We find that the larger the number of assets, the larger the magnitude of the diversity measure.

On a descriptive level, we find that the share held in risky assets has decreased, while the share held in safe and fairly safe assets has increased. This is not just because of a change in the valuation of the assets, but also because of a change in ownership. A statistically significant drop has been observed in mutual funds in favor of bonds, CDs and other financial assets.

The determinants of diversity measures indicate that diversification increases with age, the educational level and income. Having children has a negative effect. Diversity at the bottom of the wealth distribution is lower than at the top, but for the top quintile of the distribution diversity decreases.

A change in diversity is statistically significantly related to education, whether children are present, race, and the labor market situation. Life changing situations such as getting divorced, or losing one's job have a statistically significant negative effect on a change in diversification, while getting married or having deteriorating health have a positive effect.

In terms of policy implications our findings indicate that households with higher risk aversion and low *w*ealth have lower portfolio diversification. This should remind wealth management practitioners and regulators to emphasize the importance of balancing portfolios with different assets classes in order to reduce the economic vulnerability of households and increase their financial wealth.

References

Arrondel, L., L. Bartiloro, P. Fessler, P. Lindner, T. Y. Mathä, C. Rampazzi, F. Savignac, T. Schmidt, M. Schürz and P. Vermeulen (2014) "How do households allocate their assets? Stylised facts from the European Household Finance and Consumption Survey," European Central bank, Eurosystem, Discussion Paper Number 1722.

Atkinson, A. (1970) "On the measurement of inequality,"*Journal of Economic Theory* 2: 244-263.

Barasinska, N., D. Schäfer and A. Stephan (2012) "Individual Risk Attitudes and the Composition of Financial Portfolios: Evidence from German Household Portfolios, "*Quarterly Review of Economics and Finance*, 52(1): 1-14

Campbell, 2006 TO COMPLETE

Cardak, B. A. and R. Wilkins (2009) "The determinants of household risky asset holdings: Australian evidence on background risk and other factors," *Journal of Banking & Finance* 33: 850–860

Gini, C. W. (1912). "Variabilita e mutabilita". *Studi Economico-Giuridici della R. Universita di Cagliari* 3, 3 - 159.

Guiso et al, 2002 Household Portfolios TO COMPLETE

Herfindahl, O. C. (1950) Concentration in the U.S. Steel Industry. Unpublished doctoral dissertation, Columbia University.

Hirschman, A. 0. (1945) National power and the structure of foreign trade. Berkeley.

Kolm, S.-C. (1969) "The optimal production of social justice," Chapter 7, In: Margolis, J., Guitton, H. (eds.) *Public Economics: An Analysis of Public Production and Consumption and their Relations to the Private Sectors*, pp. 145-200. London: Macmillan.

Lieberson, S. (1964) "An extension of Greenberg's linguistic diversity measures," *Language* 40: 526–531.

Lieberson, S. (1969) "Measuring population diversity," *American Sociological Review* 34: 850–862.

Pietra, G. (1915) Delle relazioni tra gli indici di variabilit`a (I, II), *Atti del Reale Istituto Veneto di Scienze, Lettere ed Arti*, a.a. 1914-15, tomo LXXIV, parte II, 775–804.

Simpson, E. H. (1949). "Measurement of Diversity," *Nature 163*, 688.Stigler, G. (1968) *The Organization of Industry*. Homewood, IL: Richard D. Irwin.

Theil H. *Economics and information theory.* Amsterdam: North-Holland, 1967.

Wolff,E. (2014) Household wealth trends in the United, States, 1983–2010, *Oxford Review of Economic Policy*, 30(1): 21–43

Worthington, A. C. (2007) Households Asset Portfolio Diversification: evidence from the Household, Income and Labour Dynamics in Australia (HILDA) survey, Griffiths Business School, Discussion Paper 2009-08.

APPENDIX

Table A.1. Changes in ownership rates of financial assets (2007-2009).

	2007	2009	Diff
Safe Assets:	94.6	94.5	0.001
Transaction Accounts	94.6	94.4	0.002
CDs	18.7	20.3	-0.017*
Fairly Safe Financial Assets:	43.5	43	0.004
Savings Bonds	16.1	15.5	0.006
Cach value of life insurance	30.1	30.3	-0.002
Other managed accounts	9.7	9.7	0.000
Risky Assets:	74.5	74.3	0.003
Mutual Funds	23	21.1	0.018*
Stocks	32.1	31.7	0.004
Other bonds	8.1	11.4	-0.033***
Quasi Liquid Pension Accounts	65.4	65.3	0.001
Other Financial Assets	13.2	15.4	-0.022***

Source: SCF 2007-2009.
Note: Diff: t-statistics for the differences in ownership 2007-2009

Table A.2 The determinants of individual diversity (diversity index defined as the inverse of generalized mean (with r=2 and r=10) and Lieberson diversity index). WHICH YEAR?

	DI defined as inverse of gemeralized mean with r=2						DI defined as inverse of gemeralized mean with r=10						Lieberson					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t	b/t
Age 30-40	0.07*	-0.04	-0.04	-0.07*	-0.06	-0.12***	0.03	-0.04	-0.04	-0.05*	-0.05*	-0.08***	0.03***	0.02**	0.02*	0	0.02	-0.01
	-1.8	(-0.94)	(-1.05)	(-1.80)	(-1.51)	(-2.97)	-1.05	(-1.23)	(-1.32)	(-1.82)	(-1.72)	(-2.76)	-3.68	-1.98	-1.85	-0.26	-1.63	(-0.64)
Age 40-50	0.22***	0.06	0.04	-0.10***	0	-0.15***	0.13***	0.02	0.01	-0.07***	-0.02	-0.10***	0.05***	0.04***	0.03***	0	0.03***	0
	-5.69	-1.53	-0.97	(-2.70)	(-0.00)	(-3.87)	-4.38	-0.77	-0.32	(-2.62)	(-0.56)	(-3.60)	-5.18	-4.05	-3.51	-0.37	-3.25	(-0.12)
Age 50-60	0.28***	0.08**	0.06	-0.17***	0	-0.21***	0.15***	0.02	0.01	-0.13***	-0.03	-0.16***	0.05***	0.05***	0.04***	0.01	0.04***	0.01
	-7.23	-2.15	-1.5	(-4.39)	-0.07	(-5.44)	-5.21	-0.71	-0.19	(-4.64)	(-1.11)	(-5.56)	-6.13	-5.6	-4.93	-1.33	-4.71	-1.22
Age 60-70	0.45***	0.28***	0.25***	-0.06	0.16***	-0.10**	0.26***	0.16***	0.14***	-0.05*	0.08**	-0.08**	0.05***	0.04***	0.04***	0.01	0.04***	0.01
	-11.14	-7.27	-6.4	(-1.40)	-3.84	(-2.30)	-9.01	-5.52	-4.81	(-1.75)	-2.51	(-2.55)	-5.05	-4.9	-4.04	-0.81	-3.66	-0.57
Age 70+	0.59***	0.43***	0.39***	0.04	0.28***	-0.01	0.36***	0.26***	0.23***	0.01	0.16***	-0.02	0.05***	0.05***	0.04***	0.01	0.04***	0.01
	-14.31	-10.75	-9.53	-0.94	-6.06	(-0.21)	-11.89	-8.63	-7.63	-0.4	-4.6	(-0.59)	-5.67	-5.72	-4.54	-0.92	-3.81	-0.55
High school	0.38***	0.26***	0.22***	0.23***	0.22***	0.16***	0.22***	0.14***	0.12***	0.12***	0.12***	0.08***	0.10***	0.08***	0.07***	0.08***	0.07***	0.06***
	-11.01	-7.57	-6.46	-6.97	-6.47	-4.81	-8.51	-5.63	-4.74	-4.97	-4.75	-3.34	-12.78	-9.89	-8.5	-10.75	-8.37	-7.54
Some Uni	0.62***	0.39***	0.36***	0.35***	0.35***	0.26***	0.36***	0.22***	0.20***	0.20***	0.20***	0.14***	0.13***	0.10***	0.09***	0.11***	0.09***	0.08***
	-16.41	-10.42	-9.39	-9.83	-9.21	-6.94	-13.22	-8.09	-7.26	-7.37	-7.13	-5.15	-14.89	-11.64	-10.29	-12.92	-10.01	-9.3
University	0.90***	0.54***	0.50***	0.47***	0.45***	0.31***	0.56***	0.33***	0.30***	0.27***	0.27***	0.18***	0.11***	0.09***	0.07***	0.10***	0.07***	0.06***
	-27.61	-15.6	-14.05	-13.93	-12.5	-8.64	-23.13	-12.68	-11.43	-10.94	-10.15	-6.76	-14.9	-10.81	-8.96	-12.27	-7.95	-7.39
Married	0.30***	0.08***	0.07***	0.09***	0.06***	0.02	0.18***	0.04**	0.03*	0.04***	0.03*	0	0.03***	0.02***	0.01***	0.02***	0.01***	0.01**
	-15.29	-3.84	-3.26	-4.77	-3.01	-0.96	-12.22	-2.43	-1.96	-3.04	-1.67	(-0.06)	-7.39	-3.24	-2.73	-4.43	-2.95	-2.05
Kids	-0.01	-0.01*	-0.01	-0.02**	-0.01	-0.01*	-0.01	-0.01	0	-0.01**	-0.01	-0.01	-0.00**	-0.00*	0	0	0	0
	(-1.45)	(-1.65)	(-0.89)	(-2.39)	(-1.12)	(-1.75)	(-1.13)	(-1.35)	(-0.74)	(-2.09)	(-0.99)	(-1.60)	(-2.40)	(-1.78)	(-0.94)	(-0.95)	(-0.74)	-0.02
year	0.03***	0.03***	0.03***	0.05***	0.03***	0.05***	0.02***	0.02***	0.02***	0.03***	0.02***	0.03***	0	0	0	0	0	0.00*
	-2.96	-3.93	-3.96	-5.82	-3.86	-5.68	-2.93	-3.74	-3.76	-5.31	-3.62	-5.11	-0.51	-0.74	-0.76	-1.57	-1.09	-1.83
10K<=INCOME<25K		-0.05	-0.05		-0.02	0.02		-0.06*	-0.06*		-0.04	-0.01		0.07***	0.07***		0.07***	0.06***
		(-1.13)	(-1.13)		(-0.45)	-0.41		(-1.80)	(-1.81)		(-1.14)	(-0.27)		-6.83	-6.96		-6.67	-5.51
25K<=INCOME<50K		0.23***	0.22***		0.27***	0.23***		0.10***	0.10***		0.14***	0.12***		0.15***	0.15***		0.14***	0.12***
		-5.14	-4.9		-6.11	-5.3		-3.2	-2.98		-4.17	-3.66		-14.47	-14.43		-13.73	-11.4
25K<=INCOME<50K		0.39***	0.36***		0.42***	0.29***		0.20***	0.19***		0.23***	0.15***		0.17***	0.17***		0.16***	0.12***
		-8.75	-8.14		-9.28	-6.43		-6.14	-5.63		-6.78	-4.57		-16.44	-15.98		-15.07	-11.58
INCOME>100K		0.73***	0.69***		0.68***	0.40***		0.44***	0.41***		0.41***	0.23***		0.12***	0.11***		0.11***	0.09***
		-16.13	-15.2		-14.75	-8.48		-13.08	-12.3		-11.98	-6.61		-11.58	-10.79		-9.88	-7.84
Black			-0.25***		-0.23***	-0.13***			-0.15***		-0.14***	-0.08***			-0.05***		-0.05***	-0.04***
			(-8.08)		(-7.46)	(-4.37)			(-6.50)		(-5.93)	(-3.40)			(-7.22)		(-7.10)	(-4.93)
Hispanic			-0.23***		-0.22***	-0.17***			-0.14***		-0.13***	-0.10***			-0.07***		-0.07***	-0.06***
			(-6.24)		(-5.89)	(-4.87)			(-4.96)		(-4.61)	(-3.76)			(-7.78)		(-7.90)	(-7.15)
Other race			-0.04		-0.04	-0.03			-0.03		-0.03	-0.03			0.02		0.01	0.01
			(-0.81)		(-0.89)	(-0.73)			(-0.99)		(-1.02)	(-0.84)			-1.52		-1.24	-0.99
quintnw1				-0.44***		-0.34***				-0.23***		-0.17***				-0.16***		-0.13***
				(-13.14)		(-9.83)				(-9.36)		(-6.81)				(-20.69)		(-16.59)
quintnw2				-0.14***		-0.09***				-0.08***		-0.05*				-0.04***		-0.03***
				(-4.30)		(-2.68)				(-3.26)		(-1.92)				(-4.58)		(-3.48)

Table A.2 (continued from previous page)

quintnw4				0.21***		0.16***					0.14***		0.11***					0		-0.01
				-6.43		-5.01					-5.99		-4.77					(-0.51)		(-1.08)
quintnw5				0.60***		0.45***					0.41***		0.31***					-0.06***		-0.05***
				-20.61		-14.08					-19.15		-13.06					(-9.09)		(-6.98)
O1Employee					0.01	0.04						0	0.02						0.04***	0.02**
					-0.27	-0.77						(-0.08)	-0.5						-3.34	-2.14
O1Self-employed					0.20***	0.12**						0.14***	0.09**						0.02*	0.01
					-3.87	-2.38						-3.54	-2.31						-1.77	-1.09
O1Not working					0.18***	0.15***						0.10***	0.08**						0.05***	0.04***
					-3.86	-3.15						-2.91	-2.34						-4.57	-3.85
O2Managerial					0.12***	0.09***						0.07***	0.05**						0.03***	0.03***
					-3.88	-3						-2.82	-1.97						-3.66	-4.08
O2Sales					0.02	0.01						0	-0.01						0.02**	0.02***
					-0.52	-0.17						(-0.03)	(-0.40)						-2.45	-2.78
Construction					-0.02	-0.03						-0.02	-0.03						0.01*	0.01
					(-0.65)	(-1.27)						(-1.04)	(-1.54)						-1.71	-1.32
Constant	1.03***	0.65***	0.76***	1.04***	0.67***	0.79***		1.08***	0.87***	0.93***	1.06***	0.89***	0.93***		0.75***	0.63***	0.65***	0.82***	0.61***	0.70***
	-11.76	-6.99	-8.07	-12.21	-6.59	-7.73		-16.69	-12.54	-13.37	-16.61	-11.79	-12.22		-37.23	-28.78	-29.85	-40.77	-25.71	-29.24
R-squared	0.21	0.27	0.27	0.31	0.29	0.32		0.16	0.21	0.21	0.24	0.22	0.25		0.05	0.09	0.11	0.12	0.11	0.15
N. of cases	7714	7714	7714	7714	7714	7714		7714	7714	7714	7714	7714	7714		7714	7714	7714	7714	7714	7714

Table A.3 The determinants of the change in individual diversity between 2007 and 2009 (diversity index defined as inverse of generalized mean (with r=2 and r=10) and Lieberson diversity index).

	DI defined as inverse of gemeralized mean with r=2						DI defined as inverse of gemeralized mean with r=10						Lieberson					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Age 30-40	-0.02	-0.03	-0.04	-0.03	-0.04	-0.04	-0.03	-0.04	-0.04	-0.03	-0.04	-0.04	0.01	0.00	0.00	0.01	0.00	0.00
	(-0.39)	(-0.55)	(-0.65)	(-0.41)	(-0.58)	(-0.72)	(-0.55)	(-0.74)	(-0.91)	(-0.57)	(-0.78)	(-0.82)	-0.49	-0.3	-0.15	-0.54	-0.3	-0.11
Age 40-50	-0.02	-0.04	-0.05	-0.03	-0.05	-0.08	-0.02	-0.04	-0.04	-0.02	-0.04	-0.06	0	0	0	0	0	-0.01
	(-0.32)	(-0.74)	(-0.85)	(-0.44)	(-0.82)	(-1.36)	(-0.35)	(-0.82)	(-0.97)	(-0.51)	(-0.94)	(-1.30)	-0.16	(-0.15)	(-0.21)	-0.32	(-0.09)	(-0.77)
Age 50-60	0.08	0.05	0.05	0.07	0.04	-0.01	0.04	0.01	0.01	0.03	0.01	-0.03	0.03*	0.02	0.02	0.03**	0.02*	0.01
	-1.41	-0.85	-0.88	-1.27	-0.73	(-0.17)	-0.94	-0.32	-0.34	-0.73	-0.12	(-0.54)	-1.83	-1.46	-0.93	-2.11	-1.65	-0.62
Age 60-70	0.04	0.01	0.01	0.04	0.01	-0.06	0.02	0	0	0.02	-0.01	-0.06	0.02	0.02	0.02	0.03**	0.03*	0.01
	-0.66	-0.22	-0.25	-0.64	-0.11	(-0.93)	-0.51	-0.03	-0.04	-0.33	(-0.26)	(-1.08)	-1.6	-1.33	-1	-2.3	-1.84	-0.63
Age 70+	0.08	0.05	0.05	0.09	0.04	-0.04	0.04	0.02	0.02	0.04	0	-0.05	0.03**	0.03**	0.03	0.05***	0.04**	0.02
	-1.28	-0.81	-0.77	-1.35	-0.54	(-0.56)	-0.92	-0.41	-0.41	-0.74	(-0.09)	(-0.94)	-2.31	-2.04	-1.38	-3.4	-2.56	-1.25
High school	-0.02	-0.04	-0.05	-0.03	-0.04	-0.06	0	-0.02	-0.02	-0.01	-0.02	-0.03	-0.02	-0.02*	-0.02	-0.02	-0.02*	-0.03**
	(-0.49)	(-0.87)	(-1.12)	(-0.59)	(-0.88)	(-1.22)	(-0.06)	(-0.49)	(-0.71)	(-0.16)	(-0.48)	(-0.76)	(-1.50)	(-1.86)	(-1.13)	(-1.41)	(-1.71)	(-2.10)
Some Uni	-0.03	-0.07	-0.07	-0.04	-0.07	-0.10*	-0.01	-0.05	-0.05	-0.02	-0.05	-0.07	0	-0.01	-0.01	0	-0.01	-0.02
	(-0.59)	(-1.23)	(-1.51)	(-0.76)	(-1.28)	(-1.79)	(-0.35)	(-1.08)	(-1.39)	(-0.50)	(-1.07)	(-1.51)	(-0.10)	(-0.67)	(-0.54)	(-0.15)	(-0.65)	(-1.21)
University	0.03	-0.03	-0.04	0.01	-0.04	-0.08	0.02	-0.03	-0.03	0.01	-0.03	-0.07	0	-0.01	-0.01	0	-0.01	-0.02
	-0.7	(-0.68)	(-0.82)	-0.27	(-0.72)	(-1.54)	-0.69	(-0.82)	(-1.03)	-0.29	(-0.84)	(-1.58)	-0.37	(-0.59)	(-0.47)	-0.27	(-0.42)	(-1.29)
married09	-0.03	-0.07**	-0.09***	-0.04	-0.09***	-0.10***	-0.03	-0.06***	-0.07***	-0.04*	-0.08***	-0.09***	0	0	-0.01	0	-0.01	-0.02**
	(-0.97)	(-2.23)	(-2.80)	(-1.46)	(-2.77)	(-3.16)	(-1.32)	(-2.68)	(-3.00)	(-1.78)	(-2.94)	(-3.27)	-0.5	(-0.50)	(-1.52)	-0.21	(-1.54)	(-1.97)
Kids	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	0	-0.01	-0.01	0.01**	0.01**	0.01**	0.01**	0.01**	0.01**
	(-0.01)	(-0.11)	(-0.16)	-0.03	(-0.12)	(-0.26)	(-0.58)	(-0.67)	(-0.78)	(-0.51)	(-0.66)	(-0.82)	-2.21	-2.21	-1.97	-2.05	-2.18	-2.07
10K<=INCOME<25K		-0.04	-0.04		-0.04	-0.02		-0.03	-0.03		-0.03	-0.01		0.00	0.00		0.00	0.00
		(-0.59)	(-0.67)		(-0.62)	(-0.33)		(-0.57)	(-0.73)		(-0.58)	(-0.27)		-0.05	-0.01		(-0.01)	-0.23
25K<=INCOME<50K		0.07	0.07		0.07	0.07		0.04	0.04		0.05	0.05		0.01	0.01		0.01	0.01
		-1.12	-1.06		-1.12	-1.14		-0.95	-0.99		-1.02	-1.13		-0.79	-0.45		-0.62	-0.55
25K<=INCOME<50K		0.01	0.01		0.01	-0.01		0.02	0.02		0.02	0.01		0.02	0.02		0.02	0.01
		-0.18	-0.11		-0.16	(-0.17)		-0.39	-0.34		-0.43	-0.27		-1.25	-0.78		-1.13	-0.67
INCOME>100K		0.14**	0.14**		0.14**	0.08		0.12**	0.12**		0.12**	0.08		0.03*	0.03		0.03*	0.01
		-2.33	-2.1		-2.24	-1.23		-2.47	-2.37		-2.44	-1.55		-1.74	-1.19		-1.66	-0.6

Table A.3 (continued from previous page)

got_divorced			-0.09*		-0.09	-0.10*				-0.04		-0.04	-0.04				-0.04*		-0.04***	-0.04***
			(-1.71)		(-1.64)	(-1.75)				(-0.97)		(-0.86)	(-0.97)				(-1.85)		(-2.88)	(-2.98)
got_married			0.05		0.06	0.07				0.01		0.02	0.02				0.04		0.04*	0.04*
			-0.56		-0.63	-0.77				-0.17		-0.21	-0.32				-1.57		-1.79	-1.94
stop_work			-0.06		-0.06	-0.06				-0.04		-0.05	-0.05				-0.03**		-0.02*	-0.02*
			(-1.38)		(-1.19)	(-1.18)				(-1.00)		(-1.22)	(-1.20)				(-2.36)		(-1.67)	(-1.65)
worse			0.12		0.12	0.13				0.02		0.02	0.02				0.04		0.05*	0.05*
			-0.98		-1.13	-1.18				-0.24		-0.19	-0.22				-0.98		-1.84	-1.88
had_kids			0.12**		0.12**	0.13**				0.09**		0.09*	0.09**				0		0	0.01
			-2.26		-2.05	-2.23				-2.04		-1.86	-2				-0.1		-0.15	-0.34
Black				-0.05	-0.03	0					-0.05	-0.04	-0.02					0.02	0.02*	0.03**
				(-1.08)	(-0.73)	(-0.09)					(-1.49)	(-1.11)	(-0.60)					-1.46	-1.71	-2.4
Hispanic				-0.01	0.01	0.02					-0.01	0	0.01					0.02	0.02*	0.03**
				(-0.12)	-0.1	-0.37					(-0.32)	(-0.09)	-0.12					-1.53	-1.79	-2.08
Other race				0.01	0.01	0.01					0.01	0.01	0.01					-0.01	-0.01	-0.01
				-0.11	-0.1	-0.14					-0.17	-0.2	-0.24					(-0.46)	(-0.53)	(-0.49)
employee				0.03	-0.01	0					0.01	-0.03	-0.02					0.03***	0.02	0.02
				-0.97	(-0.27)	(-0.06)					-0.26	(-0.92)	(-0.70)					-3.27	-1.48	-1.63
selfempl				0.07*	0.01	-0.02					0.04	-0.01	-0.03					0.03***	0.01	0.01
				-1.76	-0.19	(-0.34)					-1.25	(-0.35)	(-0.85)					-2.8	-1.33	-0.74
quintnw1						-0.07							-0.03							-0.03**
						(-1.45)							(-0.86)							(-2.27)
quintnw2						0.02							0.02							0.01
						-0.45							-0.46							-0.63
quintnw4						0.06							0.03							0.01
						-1.23							-0.76							-0.92
quintnw5						0.15***							0.11***							0.03***
						-3.08							-3							-2.85
Constant	0.04	0.07	0.09	0.04	0.1	0.15		0.04	0.07	0.08	0.06	0.11	0.13		-0.02	-0.02	-0.01	-0.05***	-0.03	-0.01
	-0.61	-0.83	-1.2	-0.49	-1.13	-1.49		-0.81	-1.05	-1.51	-0.99	-1.53	-1.63		(-1.29)	(-1.05)	(-0.25)	(-2.68)	(-1.40)	(-0.53)
R-squared	0	0.01	0.01	0.01	0.01	0.02		0	0.01	0.01	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.02	0.02

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