Adjusting for age effects in cross-sectional distributions

Ingvild Almås
Norwegian School of Economics and Business Administration and University of Oslo
Bergen/Oslo, Norway
ingvild.almas@nhh.no

Tarjei Havnes
University of Oslo
Oslo, Norway
tarjei.havnes@econ.uio.no

Abstract. Income and wealth differ over the life cycle. In cross-sectional distributions of income or wealth, classical inequality measures such as the Gini, could therefore find substantial inequality even if everyone have the same life-time income or wealth. We describe the AG index (Almås and Mogstad, 2011) which is a generalization of the classical Gini index with attractive properties, and we provide the adgini command which provides the AG index as well as the classical Gini index. The adgini command provides options to produce other well known age-adjusted inequality measures, such as the Paglin-Gini (Paglin, 1975) and the Wertz-Gini (Wertz, 1977), and provides efficient estimation of the classical Gini coefficient.

Keywords: adgini, Inequality, Life cycle, age-adjustments, Gini coefficient

1 Introduction

Due to data availability, many researchers are forced to work on cross-sectional distributions of income and wealth. For example all the frequently used data sets in both the Luxembourg Income Surveys and the Luxembourg Wealth Surveys, are cross-sectional. This is problematic as both theoretical models and empirical results suggest a strong relationship between age and income and age and wealth holdings (see e.g. Davies and Shorrocks, 2000). Both relationships are firmly established as increasing up to a certain mid-life age and then decreasing thereafter.1 Hence, a snapshot of inequality within a country or other geographical area, runs the risk of providing a misleading picture of the differences in lifetime wealth or income of its citizens. As the income and wealth profiles differ across countries, the inequality ranking of countries may also be affected by transitory income or wealth differences attributable to life cycle factors. For these reasons, it has long been argued that age-adjustments of inequality measures based on cross-section data are necessary (see e.g. Atkinson, 1971).2

1. The income profile is likely to have its peak earlier than the wealth profile.
2. For expositional convenience, we will from here on out consider inequality in wealth only. However, the method applies equally to income, earnings or any other variable for which one is estimating inequality. For an application to earnings, see Almås, Havnes and Mogstad (2011).
2 Adjusting for age effects in cross-sectional distributions

Almås and Mogstad (2011) propose the Adjusted Gini (AG) index, a new method to adjust for age effects, which unlike existing methods captures that individuals differ both with respect to age and with respect to other wealth-generating factors. For example, an individual’s education is not only an important determinant of his wealth, but is also strongly correlated with his age. Existing methods (such as the Paglin and Wertz-Ginis) assume that differences between age groups in the unconditional distribution represents age effects and will, therefore, eliminate not only wealth inequality attributable to age but also differences owing to wealth-generating factors correlated with age, such as education. By contrast, the AG index eliminates inequality due to age, yet preserves inequality arising from other factors. To this end, a multivariate regression model is employed, allowing isolation of the net age effects and holding other determinants of wealth constant. Perfect equality for the AG measure requires that each individual receives a share of total wealth equal to the proportion that he would hold if all wealth-generating factors except age were the same for everyone in the population.

Similar procedures have been developed and used in Almås (2008), Almås, Cappelen, Lind, Sorensen and Tungodden (2011) and Almås, Havnes and Mogstad (2011). The two former papers focus on fairness and allow the isolation of the effect also from other factors than age. The latter studies how age-adjustments may influence trends in earnings inequality, focusing on Norway from 1967 to 2000. Note that the adgini command is general in the sense that it can be used to isolate the effects of any factor(s) influencing income or wealth, not only age.

The idea of an age-adjusted Gini index, was first put forward in the seminal work of Paglin (1975). Numerous comments were written as responses to his article, among them the comment by Wertz (1979). While the Paglin-Gini (PG) is easy to implement, it fails to meet some attractive conditions that are met by Wertz’ suggested measure (WG). However, WG fails to control for the correlation of other variables with age, as it takes the differences in mean wealth by age to represent the age effect.

Section 2 describes different age inequality measures with specific focus on the AG index. Section 3 describes the adgini command whereas Section 4 gives examples on how the adgini command can be used and how age-adjustment affects inequality results.

2 Age-adjusted inequality measures

The method underlying the AG index may be described as a three-step procedure. First, a generalization of the Gini formula is derived. Second, a multivariate regression model is employed, allowing us to isolate the net age effects while holding other determinants of income or wealth constant (hereafter wealth). Third, the wealth distribution that characterizes perfect equality in age-adjusted wealth is determined. Below, we describe the three steps, before showing that the AG index can be viewed as a generalization of the classical Gini coefficient (G).\footnote{This section relies heavily on Almås and Mogstad (2011). For further details, we refer to them.}
2.1 AG – A generalization of the Gini formula

Consider a society consisting of \( n \) individuals where every individual \( i \) is characterized by the pair \((w_i, \bar{w}_i)\), where \( w_i \) denotes the actual wealth level and \( \bar{w}_i \) is an equalizing wealth level. If actual and equalizing wealth is the same for all individuals and all individuals live equally long, there is perfect equality of lifetime wealth in this society. As will be clear when we define the equalizing wealth level formally in Section 2.3, the equalizing wealth is the same for all individuals belonging to the same age group; that is, it is a function of individual \( i \)'s age, but not of any other individual characteristics. If none of the wealth-generating factors (but age) are correlated with age, the equalizing wealth is simply the mean wealth of each age group. Further, if there are no age effects on wealth, the equalizing wealth will be equal to the mean wealth for all individuals in the society.

The joint cross-sectional distribution \( Y \) of actual and equalizing wealth is given by:

\[
Y = [(w_1, \bar{w}_1), (w_2, \bar{w}_2), \ldots, (w_n, \bar{w}_n)]
\]

Let \( \Xi \) denote the set of all possible joint distributions of actual and equalizing wealth, such that the sum of actual wealth equals the sum of equalizing wealth. Suppose that the social planner imposes the following modified versions of the standard conditions on an inequality partial ordering defined on the alternatives in \( \Xi \), where \( A \preceq B \) represents that there is at least as much age-adjusted inequality in \( B \) as in \( A \).

4. See Almås et al. (2011) for analogous conditions imposed to study equality of opportunity.

**Condition 1. Scale Invariance:** For any \( a > 0 \) and \( A, B \in \Xi \), if \( A = aB \), then \( A \sim B \).

**Condition 2. Anonymity:** For any permutation function \( \rho: n \rightarrow n \) and for \( A, B \in \Xi \), if \((w_i(A), \bar{w}_i(A)) = (w_{\rho(i)}(B), \bar{w}_{\rho(i)}(B)) \) for all \( i \in n \) then \( A \sim B \).

**Condition 3. Unequalism:** For any \( A, B \in \Xi \) such that \( \mu(A) = \mu(B) \), if \( \Delta_i(A) = \Delta_i(B) \) for every \( i \in n \), then \( A \sim B \).

**Condition 4. Generalized Pigou–Dalton:** For any \( A, B \in \Xi \), if there exist two individuals \( s \) and \( k \) such that \( \Delta_s(A) < \Delta_s(B) \leq \Delta_k(B) < \Delta_k(A) \), \( \Delta_i(A) = \Delta_i(B) \) for all \( i \neq s, k \), and \( \Delta_s(B) - \Delta_s(A) = \Delta_k(A) - \Delta_k(B) \), then \( A \succ B \).

Scale invariance states that if all actual and equalizing wealth levels are rescaled by the same factor, then the level of age-adjusted inequality remains the same. Anonymity implies that the ranking of alternatives should be unaffected by a permutation of the identity of individuals. Unequalism entails that the social planner is only concerned with how unequally each individual is treated, defined as the difference between his actual
Adjusting for age effects in cross-sectional distributions

and equalizing wealth. Finally, the generalized version of the Pigou–Dalton criterion states that any fixed transfer of wealth from an individual \( i \) to an individual \( j \), where \( \Delta_i > \Delta_j \), reduces age-adjusted inequality.

The generalized Gini formula is based on a comparison of the absolute values of the differences in actual and equalizing wealth between all pairs of individuals, and is defined as

\[
AG(Y) = \frac{\sum_{i} \sum_{j} \left| (w_i - \bar{w}_i) - (w_j - \bar{w}_j) \right|}{2n^2}.
\]

(1)

It is straightforward to see that the \( AG \) index satisfies Conditions 1–4. Note that these conditions are similar to those underlying \( G \) in all respects but one: The equalizing wealth is not given by the mean wealth in the society as a whole, but depends on the age of the individuals.

2.2 Identifying the net age effects

Suppose that the wealth level of individual \( i \) at a given point in time, depends on the age group \( a \) that he belongs to as well as his lifetime resources given as a function \( h \) of a vector \( X \) of individual characteristics

\[
w_i = f(a_i)h(X_i).
\]

(2)

The functional form of \( f \) depends on the underlying model of wealth accumulation. In the simplest life cycle model, there is no uncertainty, individuals earn a constant income until retirement age, and the interest rate as well as the rate of time preference is zero. In this model, the wealth of an individual increases up to retirement and declines afterwards. If the earnings profile is upward sloping, the model predicts borrowing in the early part of the life cycle. The fact that this is not always observed could be explained by credit market imperfections. Introducing lifetime uncertainty and non-insurable health hazard induces the elderly to hold assets for precautionary purposes, which reduces the rate at which wealth declines during retirement. If the sole purpose of saving is to leave a bequest to one’s children, individuals behave as if their horizons were infinite and wealth does not decline with age.

Empirically, we can specify a flexible functional form of \( f \), yielding the wealth-generating function

\[
\ln w_i = \ln f(a_i) + \ln h(X_i) = \delta_i + X_i'\beta
\]

(3)

where \( \delta_i \) gives the percentage wealth difference of being in the age group of individual \( i \) relative to some reference age group, holding all other variables constant. The \texttt{adgini} command will give an error message if negative values are used, and will add one unit to observations with zero values in the dependent variable. As wealth may be negative, it is

\[\text{Note that the default of the \texttt{adgini} command is the loglinear distribution, whereas it provides other distributions as options.}\]
possible to adjust the location of the distribution by adding to each wealth observation a constant equal to the absolute value of the minimum wealth observation when estimating the log-linear specification.

It is important to emphasize that the objective of the estimation of equation 3 is not to explain as much variation as possible in wealth holdings, but simply to get an empirically sound estimate of the effects of age on wealth, \( \delta_i \).

### 2.3 Defining equalizing wealth

To eliminate wealth differences attributable to age but preserve inequality arising from all other factors, the `adgini` command employs the so-called general proportionality principle proposed by Bossert (1995) and Konow (1996), and further studied in Cappelen and Tungodden (2007). Then, the absence of age-adjusted inequality requires that any two individuals belonging to a given age group have the same wealth level. Moreover, in any situation where everyone has the same wealth-generating factors except age, there should be no lifetime wealth inequality.\(^6\)

More formally, the equalizing wealth level of individual \( i \) depends on his age as well as every other wealth-generating factor of all individuals in the society, and is formally defined as:

\[
\tilde{w}_i = \frac{\mu \sum_j f(a_i) h(X_j)}{\sum_k \sum_j f(a_k) h(X_j)} = \frac{\mu n e^{\delta_i}}{\sum_k e^{\delta_k}},
\]

where \( e^{\delta_k} \) gives the net age effect of belonging to the age group of individual \( k \) after integrating out the effects of other wealth-generating factors correlated with age. No age-adjusted inequality corresponds to every individual \( i \) receiving \( \tilde{w}_i \), which is the share of total wealth equal to the proportion of wealth an individual from his age group would hold if all wealth-generating factors except age were the same for everyone in the population. If there is no age effect on wealth, the equalizing wealth level is equal to the mean wealth level in the society.

### 2.4 Relationship to the classical Gini coefficient

From equation 1, it is straightforward to see that the \( AG \) index is closely linked to \( G \). Both measures are based on a comparison of the absolute values of the differences in the actual and equalizing wealth levels between all pairs of individuals. The distinguishing feature is how equalizing wealth is defined. For \( G \), the equalizing wealth level is assumed to be \( \mu \): Perfect equality requires not only equal lifetime wealth, but additionally that

---

\(^6\) In a study of income inequality in the United States, Bishop et al. (1997) use a method to make age-adjustments which disregard that the underlying income function is not additively separable. First, they estimate a multiplicative separable income function, which can be expressed as \( \ln Y = a_0 + \beta \text{Age} + Z'\gamma + \epsilon \), where \( a_0 \) is a constant, \( \text{Age} \) is the age and \( Z \) is a set of controls. Next, they use the prediction \( \ln Y^* = \ln Y - \beta \text{Age} \) as their age-adjusted income measure. However, the net age effect is given by \( \frac{d}{d\text{Age}} \), which is generally different from \( \beta = \frac{d\ln Y}{d\text{Age}} = \frac{dY}{Y} \frac{1}{d\text{Age}} \), as \( Y \) is a function of \( Z \). If \( Z \) is correlated with \( \text{Age} \) then Bishop et al.’s approach will fail to capture the net age effects.
individuals of all ages must have the same wealth holding in any given year, which can be realized only if there is a flat age–wealth profile.

However, a flat age–wealth profile runs counter to both consumption needs over the life cycle as well as productivity variation depending on human capital investment and experience. Indeed, the relationship between wealth and age can produce wealth inequality at a given point in time even if everyone is completely equal in all respects but age. As transitory wealth differences even out over time, a snapshot of inequality produced by \( G \) runs the risk of producing a misleading picture of actual variation in lifetime wealth. In comparison, the \( AG \) index abandons the assumption of a flat age–wealth profile and allows equalizing wealth to depend on the age of the individuals. By doing this, the \( AG \) index purges the cross-sectional measure of inequality of its inter-age or life-cycle component. If \( \bar{w}_i = \mu \) for all individuals in every age group, the age–wealth profile is flat and the \( AG \) index coincides with \( G \). If there is a relationship between age and wealth, the \( AG \) index will in general differ from \( G \).

To get further intuition on the similarities and differences between \( G \) and the \( AG \) index, it is helpful to see the correspondence between the standard representation of the Lorenz curve and a Lorenz curve expressed in differences between actual wealth and mean wealth in the society as a whole. Figure 1 displays standard and difference based Lorenz curves for the same wealth distribution. The area between the standard Lorenz curve and the diagonal of the upper diagram (the line of equality) is identical to the area between the difference based Lorenz curve and the horizontal axis (the line of equality) in the lower diagram. The classical Gini coefficient is in both cases equal to twice the area \( A \), between the Lorenz curve and the line of equality.

In a similar vein, we can draw the age-adjusted Lorenz curve underlying the \( AG \) index, expressing the differences between actual wealth and the equalizing wealth in the population. And just as for \( G \), the \( AG \) index is equal to twice the area between this difference based Lorenz curve and the horizontal axis (line of equality). When drawing age-adjusted Lorenz curves, however, individuals are ordered not by their wealth per se, as in Figure 1, but according to the difference between their actual wealth holdings and the equalizing wealth in their age group. Both \( G \) and the \( AG \) index reach their minimum value of 0, if everyone receives their equalizing wealth. Moreover, both measures take their maximum when the difference between actual and equalizing wealth is at its highest possible level. Specifically, \( G \) reaches its maximum value of 1 if one individual holds all wealth. In comparison, the \( AG \) index takes its maximum of 2 in the hypothetical situation where the equalizing wealth of the individual who has all the wealth is zero, and the equalizing wealth of one of the individuals with no wealth is equal to the aggregate wealth in the economy. The fact that the \( AG \) index and \( G \) range over different intervals is therefore a direct result of their different views of perfect equality: Age-adjusted inequality is not only a result of differences in individual wealth holding, but also due to differences in equalizing wealth across individuals in different age groups.
Figure 1: **Two representations of the standard Lorenz curve.** The figure displays two representations of the standard Lorenz curve, where the classical representation relies on cumulative income shares and the difference based representation relies on cumulative shares of the difference between the average income and the actual income. The area $A$ is the same in both panels.
2.5 Relationship to WG and PG

There are two distinguishing aspects of age-adjusted inequality measures. First, they hold different views on how equalizing wealth should be measured. Second, the formula for calculating the differences between individuals’ actual and equalizing wealth levels differ. The \texttt{adgini} command gives two alternative age-adjusted inequality measures as options: the Paglin-Gini (\textit{PG}) and the Wertz-Gini (\textit{WG}). They both have the same objective as the \textit{AG} index, namely to purge the classical Gini coefficient applied to snapshots of wealth inequality of its inter-age or life cycle component. In particular, the condition of a flat age-wealth profile is abandoned. Below, we use the above conditions to assess the properties of \textit{PG} and \textit{WG}, and characterize their relationship to the \textit{AG} index.

Due to its close relationship to the \textit{AG} index, it is convenient to first consider \textit{WG}, which was proposed by Wertz (1979). \textit{WG} can be expressed as follows:

\[
WG(Y) = \sum_j \sum_i \left| \left( w_i - \mu_i \right) - \left( w_j - \mu_j \right) \right|^2 \frac{2\mu n^2}{},
\]

where \( \mu_i \) and \( \mu_j \) denote the mean wealth level of all individuals belonging to the age group of individual \( i \) and \( j \), respectively. Like the \textit{AG} index, \textit{WG} is based on a comparison of the absolute values of the differences in actual and equalizing wealth levels between all pairs of individuals and ranges over the interval \([0,2]\). It is also straightforward to see that it satisfies Conditions 1-4. However, \textit{WG} defines the equalizing wealth of an individual \( i \) as the unconditional mean wealth levels in his age group, \( \mu_i \), and will therefore eliminate not only wealth inequality attributable to age but also differences owing to wealth-generating factors correlated with age, such as education. The standard omitted variables bias-formula tells us that \textit{WG} will be equal to \textit{AG} whenever age is uncorrelated with omitted wealth-generating factors. Hence, \textit{AG} may be viewed as a generalization of \textit{WG}, important in situations where omitted variables bias is a major concern.

Next, consider the much used \textit{PG}, which can be expressed as

\[
PG(Y) = \sum_j \sum_i \left( |w_i - w_j| - |\mu_i - \mu_j| \right) \frac{2\mu n^2}{},
\]

where \( \mu_i \) and \( \mu_j \) denote the mean wealth level of all individuals belonging to the age group of individual \( i \) and \( j \), respectively. Applying the standard Gini decomposition, \textit{PG} can be re-written as

\[
PG = G - G_b = \sum_i \theta_i G_i + R
\]

where \( G_b \) represents the Gini coefficient that would be obtained if the earnings of each individual in every age group were replaced by the relevant age group mean \( \mu_i \); \( G_i \) is
the Gini coefficient of earnings within the age group of individual $i$, $\theta_i$ is the weight given by the product of this group’s earnings share $\frac{n_i}{\mu n}$ and population share $\frac{n_i}{n}$ ($n_i$ being the number of individuals in the age group of individual $i$), and $R$ captures the degree of overlap in the earnings distributions across age-groups (see e.g. Lambert and Aronson, 1993).

Similar to the case of $WG$, $PG$ also defines the equalizing wealth of an individual $i$ as the unconditional mean wealth levels in his age group, $\mu_i$, disregarding that other wealth-generating factors are correlated with age.

In addition, $PG$ is based on a comparison of differences in the absolute values of actual and equalizing wealth levels between all pairs of individuals, $|(w_i - w_j)| - |(\mu_i - \mu_j)|$. This violates the Unequalism condition, because $|(w_i - w_j)| - |(\mu_i - \mu_j)| = 0$ does not necessarily imply that $|(w_i - \mu_i) - (w_j - \mu_j)| = 0$.

As $|(w_i - w_j) - (\mu_i - \mu_j)|$ provides an upper bound for $|(w_i - w_j)| - |(\mu_i - \mu_j)|$, it follows that $WG \geq PG$. As stated in Proposition 1 in Almås and Mogstad (2011), $PG$ will differ from $WG$ if there is any age effect on wealth, provided that there is some within age group wealth variation. Moreover, overlap in the wealth distributions across age-groups, that is, $R > 0$, is a sufficient condition for $WG > PG$. A corollary is therefore that $PG$ is likely to yield a different ranking that $WG$ in situations where countries differ substantially in the degree of overlap. This result speaks to a main controversy surrounding the $PG$, namely whether or not $R$ should be treated as an inter-age or a within age-groups component.

Until recently, the issue was unsettled simply because little was known about the overlap term; Shorrocks and Wan (2005), for example, refer to $R$ as a "poorly specified" element of the Gini decomposition. However, Lambert and Decoster (2005) provide a novel characterization of the properties of $R$, showing firstly that $R$ unambiguously falls as a result of a within-group progressive transfer, and secondly that $R$ increases when the wealth holding in the poorer group are scaled up, reaching a maximum when means coincide. This makes Lambert and Decoster (2005, p. 378) conclude that "The overlap term in $R$ is at once a between-groups and a within-groups effect: it measures a between-groups phenomenon, overlapping, that is generated by inequality within groups". Therefore, $R = 0$ is necessary for $PG$ to net out the inter-age component, and nothing but the inter-age component, from cross-sectional inequality measures.

---

7. Overlap implies that the wealth holding of the richest person in an age group with a relatively low mean wealth level exceeds the wealth holding of the poorest person in an age group with a higher mean wealth level, that is, $w_i < w_j$ and $\mu_i > \mu_j$ for at least one pair of individuals $i$ and $j$.

8. See Almås and Mogstad (2011) for further discussion and a simple numerical example.

9. Nelson (1977) and others argue that $R$ is part of inter-age inequality and should thus be netted out when constructing age-adjusted inequality measures. Paglin (1977), however, maintains that $R$ is capturing within-group inequality and that $PG$ is accurately defined.
3 The adgini command

3.1 Syntax

adgini depvar [ agegroups ] [ if ] [ in ] [, controls(varlist) estname(string)
   equalizing(varname) all paglin regress_options ]

3.2 Description

The adgini command estimates alternative Gini coefficients for depvar, adjusting for agegroups, while holding controls constant. adgini always estimates the classical Gini coefficient. If agegroups are specified but controls are not specified, adgini also estimates the Wertz-Gini (WG) by default (Wertz, 1977), or the Paglin-Gini (PG) and the Between-Gini (BG) if the option paglin is activated (Paglin, 1975). If both agegroups and controls are specified, adgini also estimates the Adjusted Gini (AG). If the option all is activated, adgini estimates G, WG, PG, BG and AG (when relevant).

3.3 Options

controls(varlist) specifies a set of control variables (correlated with agegroups) that are not to be adjusted for when calculating AG.
estname(string) requests that regression results are to be stored in memory under the name specified.
equalizing(varname) specifies a variable in memory containing equalizing values to be used in calculating AG. In this case, agegroups and controls are not used in the estimation even if specified.
all requests calculation of all relevant Ginis (G, WG, PG, BG and AG).
paglin requests calculation of PG (the default is WG).
regress_options are any of the options documented in [R] regress.

3.4 Saved results

adgini saves the following results in r() (when relevant):
Ingvild Almås and Tarjei Havnes

Scalors

- r(gini): Gini
- r(pg): Paglin-Gini
- r(ag): Adjusted Gini
- r(bg): Between-Gini
- r(rg): Wertz-Gini
- r(N): Number of observations used in the estimation

Macros

- r(cmd): adgini
- r(depvar): Name of dependent variable
- r(agegroups): List of variables in agegroups
- r(controls): List of variables in controls
- r(equalizing): Name of variable with equalizing values
- r(regoptions): Regress options

4 Examples

We provide two examples. The first example is a straightforward application of the method and the adgini command described in the paper, namely to correct for age effects without at the same time eliminating effects from education (which is likely to be correlated with age). The second example illustrates the generality of the procedure as it demonstrates how we can use the adgini command to show the dispersion of prices corrected for quality effects without at the same time eliminating the effect from other variables correlated with quality.

Example: Income inequality (mother’s labor income)

The most standard use of inequality indices is on income distributions. In the current example, we use an instructional data set from Wooldridge (2001) on labor income of mothers. We are interested in the inequality of labor income, when we adjust for the individual age. However, we do not want to take out the effect of education, which is likely to be correlated with age. To account for age and education in the most flexible way, we control for indicator variables for every value of age and education using the xi command.

```
. use http://fmwww.bc.edu/ec-p/data/wooldridge2k/LABSUP
. xi: adgini labinc i.age, c(i.educ) all
i.age _Iage_21-35 (naturally coded; _Iage_21 omitted)
i.educ _Ieduc_0-20 (naturally coded; _Ieduc_0 omitted)
```

<table>
<thead>
<tr>
<th>Scalar</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini</td>
<td>.654</td>
</tr>
<tr>
<td>Between-Gini</td>
<td>.114</td>
</tr>
<tr>
<td>Paglin</td>
<td>.539</td>
</tr>
<tr>
<td>Wertz</td>
<td>.666</td>
</tr>
<tr>
<td>AG</td>
<td>.659</td>
</tr>
</tbody>
</table>

Example: Gini as a measure of dispersion

Gini coefficients may also be used as a measure of dispersion in other contexts than income or wealth. For instance, we may be interested in summarizing the dispersion of prices for comparable goods. However, we may not want our measure of price dispersion to reflect differences in the observable quality between goods. adgini can be used to calculate such a dispersion measure,
where we enter price as depvar, quality variables as agegroups, and non-quality variables correlated with quality in controls. Notice that the impact of quality variables on price should be properly identified in the empirical model.

```
. sysuse auto
   (1978 Automobile Data)
. adgini price mpg length turn trunk, c(foreign weight) all
```

5 Concluding remarks

We have provided a description of the method for age adjustment in cross sectional distributions and the adgini command which provides corresponding inequality statistics in Stata. As a biproduct, the adgini command provides a faster estimation of the classical Gini coefficient than existing algorithms by the use of STATAs built-in matrix language MATA. We believe that the adgini command will serve as a useful tool for statistical bureaus as well as individual researchers studying wealth, earnings, or income distributions.

6 Acknowledgements

This paper is part of the research activities at the ESOP centre at the Department of Economics, University of Oslo. ESOP is supported by The Research Council of Norway. We would like to thank ESOP as well as The Research Council for the opportunity to work on this paper.

7 References


Adjusting for age effects in cross-sectional distributions