Child Labor in 18th Century Fontecchio

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Proposal:

Catasti's are 18th century taxation documents administered under the direction of King Charles III of Spain; Charles III was interested in unifying Italy's taxation system as a way to provide additional capital for Spain, and, more importantly, to ensure that his dream of building an Italian palace similar to that of Versailles was successful (Henderson, 1968). Ultimately, Charles III did succeed in building a grand palace in Caserta, but, more importantly to historians and economists, dozens of Catasti's were left behind, preserved delicately in research libraries in L'Aquila and Naples, Italy (Italy Heritage, 2016). Of the Catasti's preserved is the 1745 Fontecchio Catasti, which illustrates the complex Fontecchio community located in the Italian province of Abruzzo; Italians often refer to Abruzzo as "God's country" (In Italy, 2016). The Fontecchio Catasti describes the community quantitatively, and with data pertaining to household structure, employment status, marital status, wage labor performed, arable land owned by each household, in addition to assets held by each household (cows, vineyards, sheep, etc.), economists and historians alike are truly able to understand what life was like in 1745 Fontecchio. This paper will take advantage of the wealth of data available in the Fontecchio Catasti to assess the role that child labor played in dual versus single parent households in the community.

Child labor and household structure became a focus of economic literature in the late 20th century as a result of increased divorce rates (Page, 2004). Economists were curious how dual and single parent households mobilized child labor, and whether households were utilizing child labor out of economic need or simply as a form of punishment. What became clear relatively quickly, in research conducted by Hao (1996), is that "family net wealth […] varies with family structure along three lines, marriage-remarriage, marriage-cohabitation, […] and male-female

single parenthood," or in phrasing more specific for this project, a dual parent household is a "wealth enhancing institution." Hao concluded that wealth strongly contributes to labor allocation in the household; in dual households parents carry the burden of maintaining household subsistence, while single parent households must implement wage based child labor in order to maintain household subsistence (Hao, 1996). Hao sustains an argument that child labor is needed in many households, and many other economists agree with this conclusion. Thomson (1994) points out that far too many people assume child labor is an act of cruelty forced upon children by their parents, but in reality, especially in societies without stringent labor laws (i.e. 1745 Fontecchio), many children worked out of need to provide for the family. Using the rationale of both Thomson and Hao it can be assumed that single parent households, which are not considered wealth enhancing institutions, would have utilized child labor more to obtain household subsistence in 1745 Fontecchio. What makes this assumption even stronger, according to Berkner (1973), is that the structure of Italian 18th century households was not much different than today, this validates the use of Hao and Thomson's research in making assumption about 1745 Fontecchio.

The primary question this paper will address is: how does child labor in 1745 Fontecchio differ between single and dual parent households? This question will be answered through an examination of 151 households in the Fontecchio Catasti. Each household in the data set has its unique components, however, some of the standard components are that every single parent household is as a result of death of the father, and that all wage based labor is performed by those identified as males. With this in mind it is a reasonable hypothesis that single parent households would implement male child labor in order to fill the income gap left by the loss of the father. In order to measure the accuracy of this hypothesis, and other assumptions made throughout the

proposal, significance testing as well as components of the Basu and Van (1998) child labor model will be utilized. The combination of significance testing and components of the child labor model can be applied to provide a prediction on how child labor was utilized in single and dual parent households in 1745 Fontecchio.

Literature Review

King Charles III, who ordered the catasti to be conducted on Fontecchio and other neighboring mountain villages, provided economic historians with a rare glimpse into the household labor distribution, income distribution, and asset holdings of single and dual parent households in 1745 Fontecchio. This literature review will investigate current economic research pertaining to household structure and its impact on child labor usage; child labor being defined as any wage based labor participated in by a child 16 or under. The main themes of this literature review will be: (1) household structure and income, (2) household structure and labor distribution, and (3) household structure in relation to asset holdings.

Household Structure and Income

Household structure is a major component to the financial success of a family, the education of the children in a family, and the amount of food a family consumes, particularly in 1745 Fontecchio. Research by Page (2, 2004) indicates that dual parent households from 1960-1995, as compared to single, had average incomes 40-45% higher and a 17% increase in food consumption. Generally dual parent households are able to generate larger economic gains and consistently meet subsistence, and in modern society this has led to an influx of proposals which incentivize dual parent households to remain dual (Page, 3, 2004). Several states within the U.S. consider the presence of dual parents critical to the economic success of the household, and some

states have gone as far as to implement policies that encourage "covenant marriages, in which couples agree at the time they are married to conditions that make it harder for them to divorce" (Page, 4, 2004). The policies implemented by some U.S. states are backed by Page's research, which indicates that "children whose parents divorce […] experience a short-term income reduction" that takes multiple years to recoup, if it ever recoups at all (Page, 3, 2004). However, even with increased incentives households continue to separate at their own economic detriment, and solving the issue of divorce remains a high priority of many states.

As divorce rates rise Page has been better able to analyze how children are impacted by changing household structure. One of the more interesting research points realized by Page is that children who grow up in single parent households are worse off than those whose parents' divorce at some point while they're alive (4, 2004). One possible explanation that Page focuses on is that single parent households, especially if headed by a female, make significantly less income; in 1999 median family income for a dual parent household with children was $60,296, whereas median family income for a single parent female-headed household with children was $22,418 (Page, 4, 2004). Weiss (2, 1984) finds this to be the case not only in 1999 but historically as well, stating that "female-headed households are (consistently) likely to be low-income households." This information is especially relevant when analyzing 1745 Fontecchio households, as all single parent households were headed by females.

Not all economic research aligns with the conclusions presented by Weiss and Page. Dassanayke (668, 2015) finds that that "female-headed household, as a whole, do not have lower incomes than male-headed households." Dassanayke's conclusion is based on household research in Zimbabwe and South Africa, which is why it appears polar to Weiss and Page, whose research is primarily Eurocentric. Overall, Dassanayke's input may actually prove more useful in

a comparison to Fontecchio, as the households she examined are located in less industrialized communities, which are more comparable to 1745 Fontecchio households than the more industrialized households analyzed by Weiss and Page.

In some cases changes in household structure results in a level of income where parent(s) are unable to provide for their children. Chou (183, 2013) found that structure is significantly associated with child poverty risk. Santiago (332, 2011) found that single parent households are greatly impacted by "poverty-related stress, a collection of stressors that frequently co-occur in the lives of low-income families, including exposure to violence, economic stress, deteriorating family relationships, and discrimination." Government welfare programs, such as food stamps in the U.S., have attempted to help households cope with poverty and the stressors that come with it. Even with welfare programs poverty can remain pervasive and prove a long term stressor for single parent households. Often family's in poverty become rapidly less efficient as a result of increased stress, as Brandon (2001) suggests.

Research suggests that single parent households do not make as efficient use of their disposable income as dual parent households (Brandon, 3, 2001). This research is backed by the assumption that single parent households are more likely to turn to habits like "alcohol or drug use" not previously associated with their spending, which ultimately inhibits the success of the entire household (Brandon, 3, 2001). In order to further understand the relationship between household structure and income some economists have utilized a labor-leisure model; with a labor-leisure model economists are capable of measuring the relationship between household structure and income. In a labor-leisure model, if income increases to a level that maximizes the utility of the household the household will respond by allocating more time to leisure and therefore less to work. This reallocation of time can possibly lead to an overall better quality of

life for both the heads of the household and the children. In a single parent household reaching the utility maximizing point is much more difficult because, as Page illustrated earlier, income in single parent households is statistically much lower than dual parent households. Regardless, a household is assumed to always be seeking to maximize their utility subject to their budget constraint available time and number of children, so that a single parent may be motivated to use child labor as a source of household income. This does not necessarily mean that the parent is cruel, but rather that they seek the best economic and social situation for their household possible. Overall, income is an important component to examine when analyzing child labor allocation in households, as income seems to be a direct determinant of whether or not child labor is employed in any capacity. Historically, in Fontecchio, income in the household has come from three central figures, but this changes as a result of changes in household structure. It should be noted that economic household research commonly assumes that the wife, while married, is never the primary income provider; this has changed in recent time, an example being female identified economics professors who are often the primary income providers in their household.

In dual parent households there are considered "three possible providers of income, the husband or father, arbitrarily characterized as the head of the household, the wife, and the 'others' in the household, generally older children" (Weiss, 6, 1984). On the other hand, in single parent households there are only two providers of income, the "former wife or present head" and the others (Weiss, 6, 1984). In this case others can be characterized as anyone from children to grandparents, but it is assumed a household would turn to child labor before turning to elderly labor. It seems plausible that as a result of the move from a dual to single parent household income would decrease, and that this decrease in household income could lead to lower quality

of life for children, increased child labor, and a situation where the parent may be unable to meet household subsistence with solely their own income. It is worth noting, once again, that the Fontecchio Catasti does not disclose any single parent households as a result of divorce, but instead finds most single parent households as a result of the death of the father. It will be assumed in the analysis of the Fontecchio data that all single families were at some point dual parent households; this is the same assumption Weiss and Page make in their work.

Household Structure and Labor Distribution

Recently, within the past half-century, the more predominant issues raised by economists in relation to the household are the impact of parental absence on child labor, rational labor supply, and the value of child labor in increasing total family welfare. Schultz (2, 1973) suggests that labor distribution changes substantially in a single versus dual parent households. In dual parent households total labor is commonly distributed between the father, and the mother; the primary difference in their labor is that the fathers is wage based and the mother's non-wage based. In 1745 Fontecchio wage based labor was solely allocated to the father, however, in some cases the mother may have been producing more for the household. Mothers were engaged in household production, or taking care of the family assets, which could include cows, sheep, vineyards, and occasionally saffron, all of which could prove much more valuable than wage labor performed by the father. With a father conducting wage based labor, and a mother engaged in household production, the health of children in the household increases exponentially; Schultz measured this using a Grossman health production model (Schultz, 4, 1973). Overall, in a dual parent households there is higher income potential which "reduces the need to depend on children as a source of income, thus decreasing child labor" (Schultz, 9, 1973).

Lower levels of child labor allow children, in Fontecchio, but perhaps only male children, to receive an education, which could ultimately lead an increases in future household income. In communities such as 1745 Fontecchio, an education implied literacy, which enhanced access to resources across the community and province. With enhanced access to resources, a family's community status and economic stature would potentially increase. Ultimately, the overwhelming benefit of dual parent households is better allocation of labor leading to increased "consumption possibilities" (Schultz, 9, 1973).

Research by Chiappori (2, 1988), indicates that dual parent households, with evenly allocated labor among the father and mother, are able to make more educated household decisions that maximize the family's utility function. By borrowing tools from "cooperative game theory," research concludes that households which have a "collective household decision process" pertaining to labor distribution are better able to maximize household utility (Chiappori, 2, 1988). Maximization of household utility indicates to economists that household labor is being allocated most efficiently. In single parent households a collective decision making process cannot be utilized, and instead parents assign children labor without consulting the preferences of the child, all with the intention of maximizing the household utility. This is a case of asymmetric information, where the single parent knows that work needs to be done but not the work that best fits the skill level of the child and that maximizes household utility. Unsurprisingly, according to Grindling (117, 2008), many single parent households push children into the labor force although they could have better provided for the family in a different role, perhaps as an academic.

Child behavior in relation to child labor is another interesting component that researchers have examined, specifically differences in child behavior toward labor when the mother leaves as compared to the father. Portner (103, 2016) found that "girls suffer significantly from the

absence of their mother" and typically discontinue education completely, while with the absence of the father household and daily life often remains constant. On the flipside, if the father leaves, either via death or divorce, boys tend to increase their labor quantity but do so by taking away from their leisure time, rather than discontinuing school (Portner, 103, 2016). What Portner attempts to explain is the preferences girls and boys have as children and how they are different. Girls are found to generally focus on either labor or education, while boys attempt to balance both labor and education by limiting their leisure time. It should be noted that Portner' findings are qualitatively based, which subsequently decreases their validly from an economic standpoint.

Based upon the evidence presented by Portner on child labor behavior, as well as Schultz and Chiappori's research, it appears clear that the absence of a parent impacts household labor distribution and is especially important in determining the economic role children play in the household both short and long term. In addition, these researchers propose that dual parent households are able to obtain a higher utility level and their children a greater education as compared to if only one parent was present. In some countries, like Ghana, laws have been implemented to ensure that "households do not use children as instruments to diversify their income portfolios," though research suggests this continues to happen commonly in one parent households (Koomson, 104, 2016). Such laws did not exist in 1745 Fontecchio, which would suggest to researchers that child labor did play an important role in single parent households at the time.

Household Structure and Asset Holdings

Becker (262, 2016) found that with "increasing labor income risk" single parent households have an increasing reluctance to "hold stocks" (assets). Becker investigated over a

five year time span how households determine whether or not to invest in an asset, eventually finding that,

> Indeed higher variation, i.e. higher income risk, reduces the propensity to invest in risky assets. However, when controlling for household heterogeneity, as well as subjective measures of a household's financial situation (income satisfaction, worries about financial situation), the impact of observed labor income variation vanishes. It is therefore concluded that in particular the perception of investment risk and of the riskiness of the environment determines the investment decision to a great extent (Becker and Dimpfl, 280, 2016).

Many of the assets Becker references are agricultural, which provide the bulk income to rural households. Guri (17, 2016) utilized a farm level database to show that agriculture and other asset holdings do have a possibility of providing large amounts of income to households, but because they are high risk, they are often mishandled (i.e. not taken care of or maintained) when a household is shaken up (i.e. moving from dual to single parents).

Research by Becker and Guri can be utilized to better understand asset holdings and distribution in 1745 Fontecchio. 1745 Fontecchio had a large number of vineyards and farm animals, owned by both dual and single parent households. An important question from the investigation into asset holdings may be not how much people have but rather how much income they are producing from that asset. Do single parents households have the vineyards producing output similar to dual parent households? If yes, are they utilizing child labor? If not, why is that? It should also be noted that in 1745 Fontecchio women did inherit assets of their fallen husband, they did not, like some societies, transfer assets to the nearest male relative.

Poterba (565, 2001) found that median population is the major factor contributing to decisions on asset allocation and use. Using a model with the variables age structure and asset returns Poterba generally concludes that "equilibrium returns on assets will vary in response to changes in population age structure" (565, 2001). This reasoning aligns with Becker and Guri, as

when a household moves from dual to single there is an assumed consequent decrease in the median population age of the household, meaning that decisions behind assets will not be as sound, leading to a lower inclination to invest in risky assets. Another possible reason why asset decision making may not be as sound in the event of the removal of a wage earning parent is because confidence in finding wage labor decreases. With decreased confidence reliance on owned assets increases, making them more valuable to the household's long term future but more risky to manage. Asset are an important component to consider when looking at child labor in 1745 Fontecchio, as they may, if significant enough, negate the significance of the loss of income from the loss of a wage earner in the household and therefore child labor would not need to be implemented.

Literature Review Summary

Household structure noticeably impacts household income, labor distribution among parents and children, and decision making behind asset holdings. Research by Page and Weiss demonstrates the importance of household structure in determining the overall income of the household. Together they illustrate how households at low income often utilize child labor out of need, rather than cruelty. It is important to recognize that this paper assumes that in 1745 Fontecchio child labor was instituted out of need rather than force, which would mean after the data analysis child labor should be present solely in single parent households below subsistence and not at all in dual parent households. This is not to say dual parent households never struggle, but only that according to research they are much less likely to struggle than their single parent household counterparts. Overall, Page and Weiss, among the other researchers, have many strengths as economists, but also several very alarming weaknesses.

One of the weakest points in current economic literature on household labor, is that it utilizes primarily 20th and early 21st century data. The reasoning is simple; 20th and 21st century data is more readily available (Page, 3, 2004). However, simply because the research synthesized within this paper is historically recent does not mean it's not useful. For one, the research comes from a wide variety of countries; these countries are located in places as far as Southern Africa and Western Europe, and as close as the United States. Several of these countries are in developmental stages which is relevant to Fontecchio, which was also a developing community in the 18th century. Even today Fontecchio continues to develop, though, more on a touristic front.

Another weak point in current household labor research is that it typically looks at families who have a single parent as a result of a divorce, while in Fontecchio all of the families with single parents are as a result of the death of the other parent. While death and divorce seem like two completely different scenarios, which they might be socially, economically they are similar. In both situations the household loses a primary income earner, whether that be wage or non-wage labor, and in both situations the now single parent must evaluate how to best maximize the household utility with a reduction in income. After compiling several pieces of research from economists in the past few decades it seems that child labor is instituted most commonly out of the adjustment to the loss of an income earner, rather than the cruel hand of a terrible parent. In order to evaluate the validity of this conclusion for 1745 Fontecchio a child labor model by Basu and Van will be utilized.

Model

Basu and Van established a child labor and household production model with the primary intention of providing policy advice on how child labor laws should be adjusted universally; at the time many politicians were looking to ban child labor completely, which Basu and Van felt would have negative economic repercussions. Basu and Van were not defending child labor, but sought to validate the economic benefits behind it. Together they argue that household decision making is primarily made by adults, and that wealth is the main determinant in the decision for a child to participate in wage based labor or not. Many economists argue that there is bargaining going on between adults and children in the household pertaining to wage labor, but Basu and Van model does not consider this a relevant factor. It will be assumed that decision making in Fontecchio regarding child labor was based on wealth and that bargaining was not occurring between adults and children.

The Basu and Van model has many assumptions; one of the first is that each household has a given subsistence level, and that the income of the parents must be equal to this subsistence level and also high enough to support children living in the household. It is assumed that child labor will only be implemented if household subsistence is not met (Basu and Van, 412, 1998). Much of the Basu and Van model is "based on very weak assumptions," and two of the main ones are the Luxury Axiom and Substitution Axiom; axioms are defined as statements (Basu and Van, 416, 1998). The Luxury Axiom assumes that a "family will send children to the labor market only if the family's income from non-child-labor sources drops very low" (below the subsistence level); this is followed by the Substitution Axiom, which assumes that "adult and child labor are substitutes" in production (Basu and Van, 416, 1998). The Luxury Axiom corresponds well with the argument presented in the literature review that families will integrate

child labor with the loss of a primary income producer, which is the same as saying "if the family's income from non-child-labor sources drops very low" (Basu and Van, 416, 1998). It is not clear yet whether the assumption presented by the substitution axiom will remain valid.

The Basu and Van model assumes *N* number of alike households in a community, each with the exact same structure of one adult and one child. This assumption of structure can be easily adjusted to two parents and two children, two parents and three children, one parent and two children, etc., for the Fontecchio data. This paper will examine households with one parent and two parents, but in each household, regardless of the number of parents present, the amount of children will vary. Children are assumed to be anyone age 16 and under in the Basu and Van model, as defined by international labor laws. Basu and Van state that each person in *N* households has their own independent consumption, displayed as *c.* Parents will not immediately send a child to work if the household does not reach their consumption level, as it is possible that they are exactly meeting their subsistence; they will only send their child(ren) to work if the household subsistence is not met. If a parent is sending their child(ren) to work when they are not meeting their consumption, but meeting subsistence, there must be some other explanation for that child working.

Within the Basu and Van model child labor usage, listed as *e*, can take on the value of either 0 or 1; 0 meaning a child is not working, and 1 meaning a child is working (the model assumes that adults always work, regardless of wage rate).This situation is illustrated in equation [1.1]:

$$\{(c, e)|c \geq 0, e \in (0, 1)\} \qquad [1.1]$$

For the Fontecchio analysis [1.1] will also be assumed. There is a specific point at which family's will have to utilize child labor in order to ensure they do not fall below the certain

"exogenously fixed subsistence level," defined as *s*. When c > *s* child labor is not preferred, and when c < *s* child labor is instituted, as displayed in equation [1.2]:

$$(c, 0) > (c + \delta, 1)\ if\ c \geq s, and\ (c + \delta, 1) > (c, 0)\ if\ c < s \qquad [1.2]$$

Similar to [1.1], [1.2] will be held the same for the Fontecchio data. Finding a balance in child and adult labor is critically important for a household aiming to maximize its utility, and it is assumed by the Basu and Van model that all households will be optimizing; this will also be assumed with Fontecchio. The Fontecchio data does not indicate whether or not children attend school, or help with nonwage based labor in the household, so the model will assume for Fontecchio children that are not working to any extent 100% of their time is allocated toward leisure.

Within any given household's budget constraint wc represents earnings of children, while wa represents adult earnings. Consumption, *c*, is multiplied in the budget constraint by how many people are present in the household. In a situation with 2 adults and 2 children, for example, c would be represented as 4c. An example of a budget constraint is shown in equation [1.3]:

$$2c \leq wc + wa \qquad [1.3]$$

If the adult(s) and children are consuming more than the income coming into the household it does not necessarily mean the household is falling below subsistence level and that child labor should be implemented. However, it may mean that a household is dangerously close to moving below their subsistence level. The Basu and Van model makes it clear that consumption alone does not determine child labor. In any given household wa must be greater than the subsistence level of the household; if an adult's earnings fals below the household subsistence level child labor will be implemented. This is displayed in equations [1.4a] and [1.4b]:

$$0 \; if \; wa \geq 2s \qquad [1.4a]$$
$$1 \; if \; wa < 2s \qquad [1.4b]$$

An issue the Basu and Van model encounters is in the situation where wa is greater than the household subsistence level and there is still a given demand for child labor by firms, just as there is a demand for adult labor. It will be assumed that in Fontecchio this demand for child labor, regardless of parent wage rate, still persists. Basu and Van find that there is some demand for child labor, illustrated as *y,* between 0 and 1. This is displayed in equation [1.5]:

$$0 < y < 1 \qquad [1.5]$$

Another issue that complicates the model is the demand for labor by sources outside the household. Any given company, *f,* will have a demand for adult, *a,* and child labor, *e*, and can maximize their profits by using a specific combination of both, as displayed by the following. Households understand child labor as a way to stay above the subsistence level, while any given company considers child labor as a way to maximize production and profit. When an employer analyzes their profit maximizing point they take child labor into account, as shown in equation [1.6]:

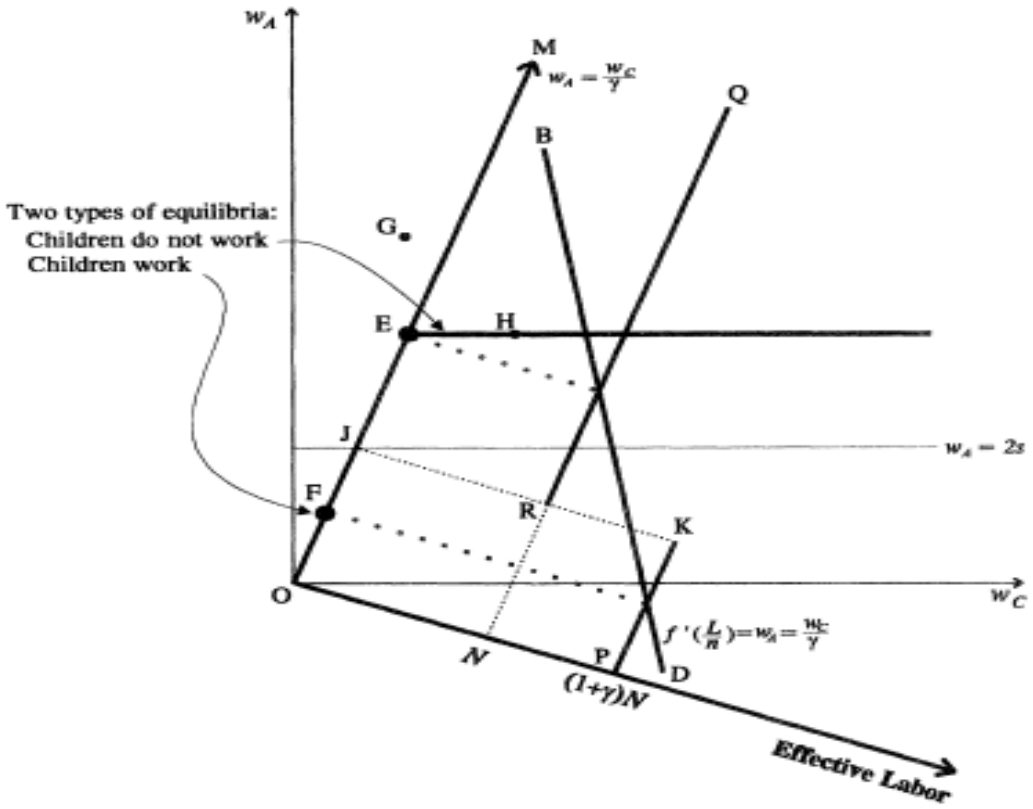
$$f(a + e) - a * wa - e * wc \qquad [1.6]$$

The solution for [1.6] is relatively simple, if wa > wc/y then demand for adults will be 0 (wc/y is considered the child wage per adult-equivalent). Overall, "Y is a simplifying assumption that adults and children are substitutes in production subject to an adult-equivalent scaling" (Basu and Van, 417, 1998). However, if wc/y > wa then demand for child labor will be 0. This is illustrated in equations [1.7a] and [1.7b]:

$$e = 0 \; if \; wa < wc/y \qquad [1.7a]$$
$$a = 0 \; if \; wa > wc/y \qquad [1.7b$$

The Basu and Van model assumes that wa can be equal to wc/y, which is the substitution axiom, and in this situation, firms will be indifferent between adults and children. In Fontecchio, we expect that the wage rate differs among individuals, so the substitution axiom will not be relevant except perhaps in a few households where adult and child wages are the same. In a situation where the substitution axiom is assumed then firms would not care if they were employing an adult or child. If wc<wa there will certainly be a higher demand for child labor, even if every given household is above their subsistence level. The Basu and Van model is illustrated below [A]:

[A]



There are two critical components to note when examining the Basu and Van model. The first is the subsistence curve, labeled as wa=2s. For the Fontecchio analysis, this line will represent the average income of dual and single parent households in Fontecchio with children

16 and under present. The second important component to note are the two types of equilibria, labelled as “children do not work” and “children do work” in the model. These points of equilibria represent where a given household best maximizes child labor given a certain subsistence level. If a household falls below the subsistence level then it is assumed they will implement child labor, which lands them on the “children do work” equilibrium. Conversely, when the household works its way back above subsistence they will cut off the child labor they implemented; it is at this point that we see “children do not work” as an equilibria. The subsistence curve and points of equilibria are the most important aspects of the Basu and Van model that will be carried over in the Fontecchio analysis.

Results

1745 Fontecchio was a considerably large community considering its remote mountain location; table [I] details the general makeup of the 151 household 1745 Fontecchio community:

[I]

Mean Persons Per Household	5.62	702 Persons Total
Average Age Father	44.85	137 Persons
Average Age Mother	43.26	88 Persons
Average age Daughters	16.36	146 Persons
Average Age Songs	16.43	710 Person

Of the 151 households in the 1745 community 86 had either one or two parents with a child 16 and under present in the household; 68 were dual parent and 18 were single parent. Table [II] analyzes the significant relationship between dual and single parent households and income. [II] breaks down the data into several components, average income, standard deviation,

T-Test (P Value), and standard error. It should be noted that income is measured in Ducato, the currency at the time (conversions are available but not significantly needed for this project):

[II]

Total Households	68 Dual	18 Single
Mean Income	56.98 Ducato	46.38 Ducato
Standard Deviation	47.31	38.36
T-Test (P Value)	0.176	Results not Significant
Standard Error	5.34	9.04

Given the P Value it appears that the relationship between household structure and income in 1745 Fontecchio was not significant (significance is achieved at .05). Possible reasoning behind this is that assets, as stated prior, made up for the loss of income from the missing parent. This is very reasonable when looking at the community as a whole, which one could argue was structured around assets and non-wage labor. Another possible explanation for why significance was not achieved is because the sample size was not large enough, perhaps if paired with data from another Catasti significance could be achieved. These results do not correlate with current economic research presented in the literature review section.

The second calculation done on the data was to see if there was significance between household structure and child labor usage. To begin this process subsistence for the 88 households had to be calculated. This calculation was done by taking the total household income of both dual and single parent households with children under 16 and dividing it by 88; this gave a subsistence level of 54.77 Ducato. It should be noted that this calculation was done differently in the Basu and Van model, but since average adult wage is not given in the Fontecchio data set the Basu and Van subsistence calculation could not be completed. Given the subsistence level, if

a family's household income falls below 54.77 Ducato and they participate in child labor they meet the "children do work" equilibrium, if a household is participating in child labor and they are above the 54.77 monetary units they are not in equilibrium, as the "children do work" equilibrium can only be met below the given subsistence level. Table [III] displays the results derived from the Fontecchio data:

[III]

Total Households	68 Dual	18 Single
Instances Child Labor Used	11	6
% Child Labor Used	16.18%	33.33%
T-Test (P Value)	0.073	Results Not Significant

Given the P Value of 0.073 it appears that in 1745 Fontecchio household structure was not significantly linked to child labor usage. There is one main reason why this test may have turned out insignificant; that reason is that the sample size for households is small, and once again, if data from another catasti was utilized perhaps significance could be achieved. Interestingly enough, in the 17 cases that child labor was utilized in 1745 Fontecchio subsistence did not appear to be a contributing factor in the decision to utilize child labor, as shown by table [IV]:

[IV]

Number of Households that Implemented Child Labor when Above Subsistence	Number of Households that Implemented Child Labor when Below Subsistence
8	9

Final results indicate that child labor was instituted regardless of household structure, and that income was not significantly linked to household structure. Although these results do not align with current economic literature they do suggest that child labor was perhaps a societal expectation in 1745 Fontecchio, and that child labor would have been implemented regardless of household wealth and structure.

Conclusion

Overall, the data points toward several definitive conclusions. One, is that Fontecchio households, regardless of income level, sought to use child labor as a way to increase their consumption capability. By increasing household consumption amount each individual in the family would be better able to maximize their own utility, which was a good enough reason to utilize child labor in 1745 Fontecchio. Simply stated, child labor served as a practical means to obtaining a more comfortable lifestyle. However, that does not mean child labor is a very efficient way to achieve high levels of consumption:

> Child Labor is inefficient when the family is so poor that parents do not leave bequests to their children. When bequests are positive, parents completely internalize the adverse impact of child labor on the future income of their children since, by reducing bequests accordingly, they can compensate themselves for the current income they lose when not making their children work. Second if bequests are interior, child labor may be inefficiently high because parents face capital market imperfections, which stop their transferring the future reduction in bequest into the present (Baland and Robinson, 664, 2000).

Baland (2000) makes a very interesting point in regards to parent intentions pertaining to child labor. In fact, Baland's point relates to Fontecchio remarkably well. In 1745 many Fontecchio households fell below subsistence, and as a result households not only struggled to maintain subsistence but were also unable to save money or assets for their children to collect on in the future. This caused an inefficiency in both single and dual parent households, and in order to

compensate for this inefficiency Fontecchio households utilized child labor. Child labor served as a temporary solution to the economic woes households faced, both in single and dual parent households.

Moving forward, there is much more data, research, and analysis to be done. Only three of the Catastis in archive currently are known to have been researched; those being, Firenze, Arischia, and Fontecchio. We are at a moment in time where research on these Catastis is more important than ever before, especially because of the large amount of earthquakes that have plagued the Abruzzo region of late; these earthquakes are destroying the very mountain towns described in the Catastis. When economists and historians ask questions about Catastis they not only learn about past communities, but also how communities have evolved to their current state. Child labor in 18th Century Fontecchio is only the beginning of the many possible projects that can be completed on the 1745 Fontecchio Catasti.

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