

Teenage Income, Turning 18, and Transfers within the Family

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The presentation will be based on two papers (both attached)

- 1. “Teenage Income, Turning 18, and Transfers within the Family”**
- 2. “The Persistent Segregation of Girls into Lower-Paying Jobs while in School”**

Teenage Income, Turning 18, and Transfers within the Family

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Preliminary Version

Abstract

This paper analyzes the effects of teenage income sources on transfers between teenager and parents, using variation arising from a policy change in the Dutch child benefit system. Since the policy change, government child benefits are paid directly to the child rather than the parents once the child has turned 18. I find that parents tax away only a part of the government benefit. Moreover, they apply a significantly lower implicit tax rate to sons than to daughters.

To explore possible causes of this gender difference, I analyze detailed data on teenagers' jobs on the side. The availability of large school-based samples allows to compare the behavior of boys and girls who are in the same school class, and have very similar education levels and family and neighborhood backgrounds. Even within these highly homogeneous groups, boys earn about 40 percent more in jobs on the side than girls. This implies different outside options for sons and daughters in family bargaining games, providing a possible explanation for the observed gender gap in tax treatment by parents.

Keywords: intra-household allocation, labor market, gender differences, teenage behavior.

JEL classification: D13, J16, J22.

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1 Introduction

This paper analyzes the effects of teenage income sources on money transfers between teenager and parents. The empirical analysis combines detailed information on high school teen behavior (the Dutch National School Youth Survey, NSYS) with variation arising from a policy change in the Dutch child benefit system in 1986. Since the policy change, government child benefits are paid directly to the child rather than the parents once the child has turned 18.

In addition to entitlement to the government benefit, reaching the age of 18 brings various new opportunities and legal rights. On his/her 18th birthday, the new adult acquires the right to vote in governmental elections, to drive a car, to legally buy alcohol and tobacco, to marry without parental consent, and to independently engage in financial transactions, such as obtaining loans. It therefore extends the teenager's outside options and is likely to change his/her bargaining position within the family.

The availability of pre-1986 and post-1986 editions of the NSYS allows to obtain double difference estimates that separate the effects of the transfer from other effects of turning 18. The estimates show that parents tax away only a fraction of the government benefit. More surprisingly, parents appear to apply a significantly lower implicit tax rate to sons than to daughters. This gender difference in tax treatment does not disappear when indirect taxation (through lower parental contributions to child-related expenditures) is taken into account.

To explore possible causes of the gender difference I analyze detailed data on teenagers' jobs on the side – paid work before or after school time, or during weekends and vacations. The nature of the data – school-based samples in which all students from a sampled class are interviewed in principle – allows

to control for class specific and neighborhood specific fixed effects, in addition to controlling for family characteristics. In Dutch high schools, classes are primarily composed on the basis of students' academic performance, given school choice. High school teenagers from a given class are therefore highly homogeneous in terms of cognitive abilities and education level. Even within these highly homogeneous groups, labor supply of boys and girls appear to differ widely: Girls participate more in job types that yield lower wages. As a result, boys earn about 40 percent more in jobs on the side than otherwise similar girls. This implies different outside options for sons and daughters in family bargaining games, providing an explanation for the observed gender gap in tax treatment by parents.

Within the empirical literature on intra-family distribution of resources, this paper is one of the few that uses quasi-experimental variation to identify the effects of income on family resource allocation.¹

The paper proceeds as follows. Section 2 considers some models of parent-teenager interaction, and their implications for shifting resources from the parent to the teenager. Section 3 discusses the NSYS data and the 1986 policy change in the Dutch child benefit system. In section 4 I report preliminary estimates of the effects of teenage income sources on transfers from parents. Section 5 analyzes the data on job types, wages, and hours. Section 6 concludes.

2 Some Models of Parent-Teenager Interaction

I use the following notation:

¹Other examples are Lundberg *et al.* (1997) and Kooreman (2000).

μ : net transfer from parent to teenager;
 y_T : teenager's non-labor income other than μ ;
 l : teenager's time not spent on work;
 h : teenage labor supply;
 c : teenager's consumption;
 w : teenager's wage rate;
 T : total time available to the teenager;
 z : parent's consumption;
 y_P : parent's income

The preferences of teenager and parent(s) are assumed to be represented by

$$U_T = \alpha \ln l + (1 - \alpha) \ln c, \quad 0 < \alpha < 1.$$

and

$$U_P = \beta \ln l + (1 - \beta) \ln c + \gamma \ln z, \quad 0 < \beta < 1, \quad \gamma > 0,$$

respectively. These simple preference specifications allow for explicit analytical solutions of the various games considered below, while capturing the key elements of parent-teenager interactions.²

The model deviates from the usual 'rotten kid' model (see, for example, Chiappori and Werning (2002)) in which only the child's utility is an argument in the parent's welfare function. In the present model the parent is not merely interested in the child's utility, but has specific preferences – possibly deviating from those of the child, if $\alpha \neq \beta$ – as to how the child should divide resources over consumption and non-work time.

²In a slightly more elaborate specification one might distinguish between teenage time spent on schoolwork (l_s) and pure leisure (l_p):

$$\tilde{U}_T = \alpha_s \ln l_s + \alpha_p \ln l_p + (1 - \alpha_s - \alpha_p) \ln c, \quad 0 < \alpha_s, \alpha_p < 1.$$

However, since l_s and l_p have the same (shadow) price, this specification implies that the teenager always chooses l_s and l_p in fixed proportions, independent of wage and (non-labor) incomes.

Nash

Given transfers from the parent and possibly from other sources, the teenager maximizes U_T subject to

$$(1) \quad \begin{cases} c = wh + \mu + y_T \\ h = T - l \\ h \geq 0 \end{cases}$$

The implied labor supply equation is:

$$(2) \quad \begin{cases} h = \max(0, h^*) \\ h^* = T - \alpha \left(\frac{wT + \mu + y_T}{w} \right). \end{cases}$$

The parent chooses the optimal value of μ given h , i.e. the parent maximizes

$$(3) \quad \beta \ln(T - h) + (1 - \beta) \ln(wh + \mu + y_T) + \gamma \ln(y_P - \mu)$$

with respect to μ . The solution, the reaction function of the parent, is

$$(4) \quad \mu = \frac{(1 - \beta)y_P - \gamma(wh + y_T)}{1 - \beta + \gamma}$$

To characterize the pure strategy Nash equilibria, distinguish between the cases $h > 0$ and $h = 0$.

Case I: $h > 0$. The optimal transfer and labor supply are given by

$$(5) \quad \begin{cases} \mu_1 = \frac{(1 - \beta)y_P - \gamma(1 - \alpha)(wT + y_T)}{1 - \beta + \gamma(1 - \alpha)} \\ h = T - \frac{\alpha(1 - \beta)}{1 - \beta + \gamma(1 - \alpha)} \cdot \left(\frac{wT + y_P + y_T}{w} \right). \end{cases}$$

Stability of the equilibrium requires that at transfer level μ_1 the teenager chooses to participate. This is the case if and only if

$$w > \frac{\alpha(1 - \beta)}{(1 - \beta + \gamma)(1 - \alpha)} \cdot \left(\frac{y_P + y_T}{T} \right) \equiv w^*.$$

Case II: $h = 0$. The optimal transfer is now

$$(6) \quad \mu_0 = \frac{(1 - \beta)y_P - \gamma y_T}{1 - \beta + \gamma}.$$

Stability of the equilibrium now requires that at transfer level μ_0 the teenager chooses not to participate. This is the case if and only if

$$w < \left(\frac{\alpha}{1 - \alpha} \right) \left(\frac{1 - \beta}{1 - \beta + \gamma} \right) \cdot \left(\frac{y_P + y_T}{T} \right) = w^*.$$

Thus $h = 0$ for $w \leq w^*$ and $h > 0$ for $w > w^*$.

Stackelberg, parent follows

In a Stackelberg game in which the teenager leads and the parent follows, the teenager chooses h such that U_T is maximized subject to the parent's response as given by (4) and the teenager's budget constraint. This yields (interior solution)

$$(7) \quad \begin{cases} h &= T - \alpha \left(\frac{wT + y_P + y_T}{w} \right) \\ \mu &= \frac{(1 - \beta + \alpha\gamma)y_P - \gamma(1 - \alpha)(wT + y_T)}{1 - \beta + \gamma}. \end{cases}$$

Stackelberg, parent leads

In a Stackelberg game in which the parent leads and the teenager follows, the parents chooses μ such that U_P is maximized subject to the teenager's response as given by (2) and the parental budget constraint. $\mu > 0$ is not imposed, i.e. in equilibrium the teenager may be required to transfer money to the parent. Considering interior solutions only, we find

$$(8) \quad \begin{cases} \mu &= \left(\frac{1}{1 + \gamma} \right) y_P - \left(\frac{\gamma}{1 + \gamma} \right) (wT + y_T) \\ h &= T - \frac{\alpha}{1 + \gamma} \left(\frac{wT + y_P + y_T}{w} \right). \end{cases}$$

Dictatorial parent

In the fully dictatorial model the child entirely behaves as demanded by

the parent. The parent maximizes U_P subject to the pooled, family budget constraint $c + z = wh + y_P + y_T$. This yields

$$(9) \quad h = T - \frac{\beta}{1 + \gamma} \left(\frac{wt + y_P + y_T}{w} \right).$$

(interior solution), implying a transfer

$$(10) \quad \begin{aligned} \mu &= c - y_T - wh \\ &= \left(\frac{1}{1 + \gamma} \right) y_P - \left(\frac{\gamma}{1 + \gamma} \right) (wT + y_T). \end{aligned}$$

Note that the transfers in the dictatorial model is identical to the transfer in the Stackelberg model with the parent leading.

Now consider the effect of a decrease in y_P by g combined with a simultaneous increase in y_T by $\delta.g$. In the latter two models we then have

$$(11) \quad \begin{aligned} \mu^{\text{post}} &= \frac{1}{1 + \gamma} (y_P - g) - \frac{\gamma}{1 + \gamma} (wT + y_T + \delta g) = \\ &= \mu^{\text{pre}} - \delta g \left(\frac{1 + \gamma \delta}{\delta + \gamma \delta} \right), \end{aligned}$$

where μ^{post} and μ^{pre} are the intra-family transfers after and before the change, respectively. If $\delta = 1$, i.e. the full government benefit is transferred from parent to teenager, we have $\mu^{\text{post}} - \mu^{\text{pre}} = -g$, i.e. the parent fully taxes away the government benefit. If $\delta < 1$, as is the case for high income households, parents will decrease the intra-family transfer by an amount larger than $\delta.g$ (the government benefit received by the teenager). For the other models discussed above, we have the same qualitative results.

Thus, while the marginal tax rate $\tau \equiv |\partial \mu / \partial y_T|$ is smaller than 1 in all models discussed above, the implication of a simultaneous increase in y_T and decrease in y_P is that parents (at least) fully tax away the increase in y_T .

Only if the teenager's additional non-labor income exceeds the original transfer from the parent ($\delta g > \mu^{\text{pre}}$) and if the parent is unable to extract more money from the child that it receives ($\mu^{\text{post}} \geq 0$), will we have lower

implicit tax rates. However, as will be reported below, $\mu^{\text{post}} < 0$ – a net transfer from child to parent – is observed in some families.

A cooperative model Consider the Pareto efficient allocations resulting from the maximization of

$$\begin{aligned}
 W &\equiv \lambda U_T + (1 - \lambda)U_P = \\
 (12) \quad &\lambda[\alpha \ln(T - h) + (1 - \alpha) \ln(wh + \mu + y_T)] + \\
 &(1 - \lambda)[\beta \ln(T - h) + (1 - \beta) \ln(wh + \mu + y_T) + \gamma \ln(y_P - \mu)],
 \end{aligned}$$

$0 < \lambda < 1$, with respect to h and μ . The intra-family transfer implied by this model is

$$(13) \quad \mu = \left(\frac{1}{1+\tilde{\gamma}}\right) y_P - \left(\frac{\tilde{\gamma}}{1+\tilde{\gamma}}\right) (wT + y_T).$$

where $\tilde{\gamma} = \gamma(1 - \lambda)$. If the teenager's bargaining power (as measured by λ) increases in w and y_T and decreases in y_P , this model implies an implicit tax that is decreasing in w and y_T and increasing in y_P .

3 The NSYS Data and the 1986 Child Benefit Quasi-Experiment

The empirical analysis is based on the Dutch National School Youth Survey (NSYS). The first NSYS survey took place in 1984. Since the second survey, in 1990, the NSYS has been repeated bi-annually. The survey is a joint effort of the Social and Cultural Planning Office of The Netherlands (SCP) and the Netherlands Institute for Family Finance Information (NIBUD). Each survey is a random sample of some 500 high school classes with approximately 12,000 students. A school that participates is compensated by means of a report summarizing the survey results for that school. The series of surveys is not a

panel, although some schools have participated more than once. The present paper is based on the 1984 and 1992 editions, and only uses data on teenagers aged 17 or 18.

In principle all students in a sampled class participate in the survey. Yet, some of them are excluded from the data, for example because a student was absent on the day when the questionnaires were filled out. The survey contains information on time use, income and jobs, expenditures, family background, and on social and psychological aspects of teenage life. There is limited information on parents (beyond education and working hours) and on siblings. For more information on the data see Kooreman (2003). Some sample statistics are reported in table 1.

In the Dutch child benefit system a parent raising a child is entitled to an untaxed government child benefit. In two-parent households the child benefit is usually paid to the mother. Entitlement is determined on a quarterly basis. The amount in quarter t depends on the age of the child on the last day of quarter $t - 1$ and – before January 1996 – on the number of children present in the household. The benefits are then credited to the recipient's bank account on the first day of quarter $t + 1$. The child benefit is independent of the parents' and child's income.

As a result of a policy change that was implemented in 1986, parents' entitlement to the child benefit stops at the end of the quarter in which the child turns 18. At the same time, the child – if in high school – gains entitlement to a government “reimbursement of schooling costs” which – contrary to the child benefit – depends on family income. For low-income households, the amount is about equal to the previous child benefit. It decreases in parental income, to a minimum that equals about one third

of the previous child benefit amount.³ Thus in terms of the model in the previous section we approximately have $1/3 < \delta < 1$.

4 The Effects of the Government Benefit on Transfers from Parents

To estimate the effect of transfers from the government on transfers from parents a regression equation was estimated as reported in table 2. The parameter of central interest, the coefficient on government benefit, is basically identified by comparing the difference between 18 and 17 year old teenagers from a given school class in 1984 with the difference between 18 and 17 year old teenagers from a given school school class in 1992. The implicit marginal tax rate parents apply to sons is 0.21 (t -value: 9.4). Girls face a much higher tax rate, 0.28, with the difference being highly significant (t -value: 4.7). The implication of most of the theoretical models considered – parents (at least) fully tax away the government transfer received by the child – is thus strongly rejected by these preliminary estimates.

In addition to taxing the child directly by lowering the intra-family transfer, parents may also tax the child indirectly by cutting on financial contributions to child-related expenditures. For example, a parent who fully pays the school tuition of his 17 year old child might stop doing so once the child receives the government benefit. The survey contains a number of questions that allow for the measurement of the degree of indirect taxation. For ten different expenditure items teenagers report whether parents contribute 100, 75, 50, 25, or 0 percent. A preliminary regression analysis (not reported) shows that the parental contributions decrease significantly in the govern-

³Further details and current amounts are posted on www.kinderbijslag.nl for children up to 18 and on www.ib-groep.nl for children aged 18 and older.

ment benefit level. For example, the results for school tuition imply that the parental contribution decreases from 96 to 68 percent once the child receives the government benefit. The girl dummies in these regressions appear to be insignificant, however. Thus these results suggest that the gender difference in direct taxation is neither amplified nor mitigated by indirect taxation by parents.

5 Teenage job types, hours, and wages

The cooperative model discussed above suggests that the gender difference might be related to differences in the wage rate boys and girl earn on the labor market. To explore this possibility, this section scrutinizes the survey information on teenage jobs.

Table 3 reports participation rates, hours, wages, and earnings in jobs for the 1984 and 1992 editions of the NSYS, separately for boys and for girls. Boys and girls have about equal participation rates, but boys earn much more than girls. Table 4 sheds more light on these early gender differences in earnings by considering job type specific participation rates (1992 only; the 1984 survey did not contain questions on the type of jobs). The most popular job for boys is delivering newspapers (17 percent participation), while only half as many girls are active in this job type. The most popular job for girls is babysitting, with a participation rate that is four times as large as the participation rate for boys.⁴

Table 5 reports the coefficients of the girl dummy in linear regressions explaining hours of work in jobs types, controlling for class specific fixed effects and a number of family characteristics. Thus, even if we control for education

⁴However, the boys who do babysit do so longer hours than babysitting girls; see table 5.

levels (as proxied by the class specific fixed effects) and family characteristics, the gender differences persist. Table 5 also reports similar coefficients with the job specific wage rates as dependent variables. The gender coefficients imply that boys delivering newspapers and working in supermarkets/stores have a 20 percent wage rate premium relative to girls. Note that the wages of boys and girls may refer to different types of activities.⁵

These results are qualitatively similar to those reported in Dustmann *et al.* (1997) who used UK data. These authors found (without controlling for class or school specific fixed effects) that boys in high school work more hours in jobs on the side than girls, and earn about 10 percent more than girls.

6 Discussion

This paper has analyzed the effects of teenage income sources on transfers between teenager and parents, using variation arising from a quasi-experiment. The results show that parents tax away a part of the government benefit received by the child, but to a much lesser extent than predicted by the theoretical models considered in section 2.

A possible explanation might be the existence of a labeling effect. In that case a label attached to an income source – "child" in this case – increases the marginal propensity to spend the labeled income source on label related expenditures; cf. Kooreman (2000) and Jacoby (2002). Labeling, however, cannot explain another empirical finding in this paper: Parents apply a significantly lower implicit tax rate to sons than to daughters. This gender difference in implicit tax treatment by parents persists once indirect taxation (lowering parental contributions to child related expenditures) is taken

⁵For example, in supermarkets boys may be more involved in loading and unloading and less in cashiering. In the case of delivering newspapers, which usually pays per copy delivered, wage differences may reflect differences in speed.

into account.

A detailed analysis of teenagers' jobs on the side revealed that – other things equal – girls earn much lower wages than boys. The difference in wages implies different outside options for sons and daughters in family bargaining games, and therefore qualifies as an explanation for the observed gender gap in tax treatment by parents.

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Table 1: Sample statistics; teenagers aged 17 or 18

	mean	median
net transfer from parent ^a (μ)	108.30	82.00
fraction $\mu > 0$: 0.877		
fraction $\mu = 0$: 0.104		
fraction $\mu < 0$: 0.019		
teenager receives government benefit	0.137	
government benefit teenager ^a (δg) (recipients only)	269.53	231
year 1992	0.429	
aged 18	0.329	
girl	0.490	
# of observations: 6174		

^a guilders per month; nominal; 1 guilder \approx 0.57 US\$ in 1992.

Table 2: Regression results; dependent variable: net transfer from parents

explanatory variable	1984 and 1992 data		1992 data only	
	estimate	<i>t</i> -value	estimate	<i>t</i> -value
constant	97.88	30.4	148.43	33.2
dummy 1992	50.02	11.1	-	-
age 18	6.36	1.3	-	-
government benefit	-0.213	-9.4	-0.193	-7.4
girl	-6.13	-1.4	-6.97	-1.1
girl * dummy 1992	-2.74	-0.4	-	-
girl * age 18	-4.25	-0.6	-	-
girl * government benefit	-0.065	-2.0	-0.134	-3.5
# of observations:	6174		2480	

Table 3: Sample statistics jobs; averages; for boys and for girls

	1984		1992	
	boys	girls	boys	girls
participation ^a	0.495	0.472	0.570	0.575
hours per week	3.25	3.73	6.62	5.36
wages per hour ^{b,c}	5.64	4.04	6.07	5.20
earnings per week ^c	18.48	13.08	39.20	28.91
# of observations	1728	1796	1418	1232

^a fraction of boys/girls reporting positive earnings.

^b participants only.

^c guilders; nominal; 1 guilder \approx 0.57 US\$ in 1992.

Table 4: Participation per type of job; for boys and for girls; 1992 data

	boys	girls
work in store / supermarket	0.11	0.13
delivering newspapers / folders	0.17	0.08
babysitting	0.05	0.24
work in restaurant/cafe/hotel	0.06	0.06
car wash	0.06	0.03

Table 5: Hours and wage; per type of job^a

	mean	median	regression coefficient on girl dummy (<i>t</i> -value)
work in store/supermarket			
<i>hours</i>	8.90	8.00	-0.82 (-1.8)
<i>wage</i>	6.13	4.96	-0.82 (-2.3)
babysitting			
<i>hours</i>	5.91	5.00	-1.25 (-3.1)
<i>wage</i>	6.39	4.62	-1.09 (-1.4)
delivering newspapers			
<i>hours</i>	4.56	3.00	-0.71 (-2.6)
<i>wage</i>	9.97	6.92	-2.19 (-2.5)

^a 1992 data; participants only.

The Persistent Segregation of Girls into Lower-Paying Jobs while in School

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March 2005

Abstract

This paper analyzes gender differences in jobs while in high school. The availability of school class based samples with detailed information on teenage jobs allows for a comparison of the behavior of boys and girls who are in the same school class, and thus have virtually identical education levels. Even within these highly homogeneous groups, boys earn substantially more than girls. The earnings gap cannot be explained by differences in participation rates and hours of work, nor by gender wage gaps within job types. It is entirely due to the fact that girls work more in job types with relatively low wages, in particular babysitting. During the period considered, 1984-2001, the gender patterns of jobs while in school largely remained unchanged.

Keywords: labor market, gender differences, teenage behavior.

JEL classification: J16, J22.

Email: <p.kooreman@eco.rug.nl>. Discussions with Bert Schoonbeek, Adriaan Soetevent, and participants in the session “Bargaining in Families” at the AEA 2005 Meeting in Philadelphia were very helpful in shaping this paper.

1. Introduction

Segregation of women into lower-paying occupations is a primary source of the gender earnings gap; see for example Blau and Kahn (2000, 2003, 2004) and Bayard *et al.* (2003). The gender earnings gap is an important motivation for the strong commitment of many governments to advancing equal education opportunities for boys and girls, and to equal pay acts and child care policies¹.

In this paper I provide evidence showing that segregation of women into lower-paying occupations already occurs at the earliest stage of their labor market careers. I compare jobs while in school of boys and girls aged 17 or 18, using school class based samples covering the period 1984-2001. By controlling for school class specific fixed effects any differences in the labor market behavior of boys and girls are unlikely to be related to unobserved differences in education. Even within these highly homogeneous groups boys earn substantially more than girls. The earnings gap cannot be explained by differences in participation rates or hours of work. It is entirely due to the fact that girls work more in job types with relatively low wages, primarily babysitting.

The gender patterns of jobs while in school largely remained unchanged during the almost two decades considered. In particular, participation rates and hours in babysitting show no systematic change for girls and boys in all academic levels within high school, even though the wage rate of babysitting has decreased relative to the wage rates of other job types.

2. The NSYS Data

The empirical analysis is based on the *Nationaal Scholierenonderzoek* (Dutch National School Youth Survey, NSYS). The NSYS surveys took place in 1984, 1990,

¹ In The Netherlands - the country where the present paper's data have been collected - the Lubbers administration widely advertised the slogan "A smart girl is prepared for her future" (riming in Dutch) during the late 1980s and early 1990s. This national campaign focused on girls aged 15 and 16, and encouraged them to pursue higher education and careers in typical male professions.

1992, 1994, 1996, 1999, and 2001. Each survey is a random sample of some 500 high school classes with approximately 12,000 students. In Dutch high schools, classes are primarily composed on the basis of students' academic performance, given school choice. High school teenagers from a given class are therefore highly homogeneous in terms of cognitive abilities and education level.

All students in a sampled class participate in the survey in principle. Yet, some of them are excluded from the data, for example because a student was absent on the day when the questionnaires were filled out. The survey contains information on time use, income and jobs, expenditures, family background, and on social and psychological aspects of teenage life. There is limited information on parents and on siblings. The seven editions of the NSYS are largely similar, although there have been changes in the wording of some questions (as indicated in the notes to the tables). For the present analysis, all students aged 17 or 18 were selected if they were in a class with at least one other student aged 17 or 18. Most of these students are in their final high school year. The NSYS shows decreasing sample sizes after 1994 (see table 1, bottom row), and has not been repeated since 2001.

Due to the combination of its school class based nature, the level of detail on jobs while in school, and the time span covered, the Dutch NSYS is a unique source of information on the earliest stage of individuals' labor market careers.

3. Gender differences in jobs while in school

Table 1 reports participation rates, earnings, hours, and wages for all editions of the NSYS. In addition to levels (medians) for boys and for girls, the table reports regressions coefficients on a girl dummy. All these regressions include class-specific fixed effects. A number of other potential controls are practically orthogonal to the girl dummy, and appear to have a negligible effect on the girl dummy outcomes. Since their inclusion would reduce the net sample size due to item specific non-response, they have not been included in the final specification.

During the 17 years considered, the overall participation rate in jobs while in school increased from about 0.5 to 0.6. Except for 1990, the participation differences

between boys and girls are insignificant. A similar pattern emerges for hours of work. Yet, boys earn about 25 percent more than girls, as shown by the results for earnings and wages. Only for 1999 and 2001 the girl dummies are not significantly different from zero in the earnings and wage regressions. Note, however, that the sample sizes in these years are relatively small. The results are qualitatively in line with those reported in Dustmann *et al.* (1997) and Pabilonia (2001).

Tables 2 and 3 shed light on the sources of these gender earnings and wage differences. Table 2 reports participation rates for the four most popular job types: working in a store or supermarket, babysitting, delivering newspapers, and working in a restaurant or cafe (participation rates for other job type are generally below 0.05). Boys and girls appear to have very different job type specific participation rates. The participation difference is largest for babysitting - about 85 percent of all babysitting is done by girls. The corresponding girl dummies are significant, large and stable.

The job type specific wages in table 3 reveal two empirical patterns of interest. First, the gender wage differences within job types are insignificant, although most of the girl dummy coefficients have negative signs. Second, there are large wage differences between job types. In all years for which job type specific wages could be computed, the ranking from low to high pay is: babysitting, store/supermarket, restaurant/cafe, and newspaper delivery, for boys as well as for girls. Moreover, between 1994 and 1999 the relative wage of babysitting decreased compared to other job types.

The insignificance of gender differences in observed wages within job types does obviously not preclude significant gender differences in the underlying distributions of potential wages. For example, in the case of newspaper delivery - which is typically done using a bicycle and pays per copy delivered - there may be a gender gap in the distributions of potential wages related to gender differences in speed and physical strength.² The gender patterns in labor market outcomes might therefore partly result from different comparative advantages of boys and girls. In addition, gender differences in preferences are likely to play a role, in supply as well as demand. Preferences may in

² Moreover, the wages of boys and girls within job types may refer to different types of activities. For example, in supermarkets boys are more involved in loading and unloading and less in cashiering than girls.

turn be affected by (perceived) on-the-job risks. For example, babysitting is generally considered to be a safer type of job than delivering newspapers, especially for girls.

The question arises whether the gender patterns vary with the academic level of a school class. Table 4 reports participation rates in babysitting for classes in VWO, the highest academic level.³ The results for this subsample are similar to those in reported in table 2.

4. Conclusion

Boys and girls with almost identical backgrounds appear to accumulate different human capital already in the earliest stage of their labor market careers. As a number of studies have found sizeable and persistent effects of work while in high school on future employment, most of the existing labor market and gender policies seem to miss a potentially important source of labor market gender differences⁴. Effective policies should recognize that gender gaps in the labor market have roots early in life.

³ Within the Dutch educational system four academic levels are distinguished within secondary education. Access to university requires graduation in the highest level (VWO).

⁴ Ruhm (1997), for example, finds that jobs held during the senior year of high school are associated with higher future earnings, wages, and occupational status. Hotz (2002) *et al.* question whether the correlations found in this literature represent causal effects.

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Table 1. Participation rates, earnings, hours, and wages

	1984	1990	1992	1994	1996	1999	2001
Participation ¹⁾							
boys	0.493	0.502	0.533	0.554	0.546	0.593	0.630
girls	0.468	0.449	0.524	0.525	0.529	0.627	0.583
girl dummy ²⁾	-0.033	-0.037	0.010	-0.029	0.002	0.030	-0.102
	(-1.5)	(-2.0)	(0.5)	(-1.5)	(0.1)	(0.8)	(-1.5)
Hours per week							
median boys ³⁾	-	8.00	9.00	8.00	8.00	10.00	10.00
median girls ³⁾	-	8.00	8.00	8.00	8.00	10.00	10.00
girl dummy ²⁾	-	-0.308	-0.536	-0.32	-0.08	0.53	-1.33
		(-0.8)	(-1.9)	(-1.0)	(-0.2)	(1.1)	(-1.5)
Earnings per week ⁴⁾							
median boys ³⁾	27.69	49.62	57.69	60.00	60.00	82.00	90.00
median girls ³⁾	23.08	37.71	46.15	50.00	50.00	72.00	70.00
girl dummy ²⁾	-4.57	-9.55	-6.73	-10.59	-9.61	-0.79	-17.3
	(-4.1)	(-5.6)	(-3.3)	(-4.3)	(-2.5)	(-0.1)	(-1.8)
Wages per hour							
median boys ³⁾	-	6.20	6.20	7.32	7.50	8.70	10.00
median girls ³⁾	-	4.96	5.54	6.11	6.25	7.27	10.00
girl dummy ²⁾³⁾	-	-1.75	-1.05	-1.74	-1.66	5.01	0.15
		(-2.0)	(-2.4)	(-3.3)	(-2.0)	(1.6)	(0.2)
USD per guilder	0.31	0.55	0.57	0.55	0.59	0.48	0.41
# classes	346	397	346	440	176	141	97
# observations	2876	3778	2611	3467	1640	1097	319

1) 1990-2001: positive hours *and* positive earnings; 1984: positive earnings (no hours information available).

2) Coefficient on girl dummy; regression with class-specific fixed effects; t-values in parentheses.

3) Participants only. Earnings and wages in nominal guilders.

4) 1984-1992: monthly earnings, multiplied by 12/52; 1994-2001: weekly earnings

Table 2. Job type specific participation rates ¹⁾

	1990	1992	1994	1996	1999	2001
Babysitting						
Participation rate boys	0.022	0.033	0.032	0.025	0.035	0.073
Participation rate girls	0.137	0.250	0.157	0.182	0.194	0.189
Girl dummy ²⁾	0.112	0.217	0.132	0.150	0.150	0.141
	(11.4)	(14.9)	(11.9)	(9.7)	(7.0)	(3.3)
Store/supermarket						
Participation rate boys	0.134	0.147	0.156	0.166	0.177	0.266
Participation rate girls	0.189	0.227	0.219	0.210	0.324	0.307
Girl dummy ²⁾	0.050	0.050	0.052	0.067	0.147	0.056
	(3.7)	(2.9)	(3.4)	(3.1)	(4.5)	(0.8)
Newspaper delivery						
Participation rate boys	0.124	0.118	0.143	0.156	0.095	0.073
Participation rate girls	0.058	0.048	0.060	0.064	0.058	0.008
Girl dummy ²⁾	-0.070	-0.060	-0.080	-0.093	-0.054	-0.060
	(-6.6)	(-4.8)	(-6.6)	(-5.3)	(-2.5)	(-2.1)
Restaurant/cafe						
Participation rate boys	0.069	0.104	0.100	0.087	0.100	0.099
Participation rate girls	0.091	0.120	0.092	0.070	0.131	0.118
Girl dummy ²⁾	0.019	0.019	-0.019	-0.017	0.025	-0.057
	(1.8)	(1.3)	(-1.7)	(-1.2)	(1.0)	(-1.3)

1) 1984: no information on job types available.

1990 and 1992: participation: respondent reports to work in job type (“What kind of work do you do most of the time?”) and has positive (total) earnings (no information on job type specific earnings available).

1994-2001: participation: respondent reports positive job type specific earnings (“What kind of (paid) work do you do sometimes? (You can check more than one item.)”) and positive job type specific hours.

2) Coefficient on girl dummy; regression with class-specific fixed effects; t-values in parentheses.

Table 3. Job type specific wages ¹⁾

	1994	1996	1999
Babysitting			
Median wage boys	5.00	5.00	7.50
Median wage girls	5.00	5.00	5.00
Girl dummy ²⁾	-0.37 (-0.4)	-0.56 (-0.7)	-1.56 (-1.1)
Store/supermarket			
Median wage boys	6.67	6.25	7.70
Median wage girls	6.11	6.31	7.50
Girl dummy ²⁾	-0.99 (-1.6)	-0.24 (-0.7)	1.72 (0.7)
Newspaper delivery			
Median wage boys	10.00	8.67	10.00
Median wage girls	7.14	7.50	10.00
Girl dummy ²⁾	-3.16 (-1.4)	-0.92 (-1.0)	1.56 ³ (0.5)
Restaurant			
Median wage boys	8.00	8.00	10.00
Median wage girls	7.00	7.32	7.50
Girl dummy ²⁾	1.37 (1.1)	-1.31 (-1.9)	-3.97 (-1.0)

1) 1984, 1990, 1992: no job type specific earnings and wages available; 2001: insufficient number of observations per job type.

2) Coefficient on girl dummy; regression with class-specific fixed effects; t-values in parentheses.

3) 1 observation excluded (wage=625).

Table 4. Babysitting participation rates; VWO only

	1990	1992	1994	1996	1999	2001
Participation						
boys	0.034	0.049	0.043	0.031	0.038	0.042
girls	0.162	0.357	0.224	0.244	0.173	0.159
girl dummy ¹⁾	0.115	0.315	0.180	0.216	0.116	0.077
	(5.9)	(10.0)	(6.5)	(7.7)	(3.1)	(1.1)
# classes	74	51	77	35	43	31
# observations	1055	606	639	528	299	115

1) Coefficient on girl dummy; regression with class-specific fixed effects; t-values in parentheses.