Labour Economics xxx (xxxx) xxx

Contents lists available at ScienceDirect

Labour Economics

journal homepage: www.elsevier.com/locate/labeco

The labour market outcomes of transgender individuals ☆

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ARTICLE INFO

JEL classification:
J15
J16
J31
J71

Keywords:
Economic outcomes
Transgender status
Gender identity

ABSTRACT

This paper uses the 2015 United States Transgender Survey of 27,715 transgender respondents to study the relationship between minority gender identity status and income, employment, and poverty rates. All transgender groups have significantly lower incomes and are more likely to be in poverty, unemployed or working part-time, when compared with men in the American Community Survey. Within the transgender sample, those who were assigned female at birth have significantly lower incomes and are more likely to work part-time than those assigned male at birth. These income results are sensitive to the degree to which respondents have socially transitioned. The younger transgender people transition and the greater their ability to 'pass', the more their income profiles reflect that of their gender identity rather than the sex they were assigned at birth. Together, these findings provide descriptive evidence in support of a traditional cisgender income gap, with 'maleness' being associated with an income premium in the workplace over 'femaleness'.

1. Introduction

Since the seminal work of Badgett (1995), a large body of economics literature has developed documenting the differences in labour market outcomes faced by those with minority sexual orientations.[1] In contrast, the economics literature has remained relatively silent on the economic outcomes of transgender individuals – a minority group which is estimated to represent 1.4 million (0.6%) adults in the US alone (Flores et al., 2016). "Assigned sex" refers to the designation of a person, typically at or before birth, as either male or female while "gender identity" refers to an individuals' deepest sense of self as being male, female, or another gender. Where a persons' assigned sex and gender identity conform, they are said to be cisgender. For example, a cisgender man is a person assigned male at birth who identifies as a man/male. I use the term transgender ('trans') in its broadest sense to refer to anyone whose gender identity and/or gender expression differs from the sex they were assigned at birth.

Societal awareness of the transgender community has increased in recent years, with transgender representation throughout popular media becoming more common (GLAAD, 2019; McInroy and Craig, 2015). There has been a similar increase in public policy discussions and legal debates on issues which impact the lives of transgender people, and the US Supreme Court recently ruled to outlaw employment discrimination on the basis of gender identity (Bostock v. Clayton County, 2020).[2] A small qualitative literature has documented the lives of transgender people, but these public policy discussions have occurred with relatively little quantitative social science evidence to inform them. Schilt and Lagos (2017) draw a parallel with the use of social science research in legal debates around gay rights in the US and point out the need for additional quantitative research to shed light on the lives of transgender people in order to direct these public policy discussions.

The study of the transgender population offers a unique opportunity to researchers interested in the economics of gender more broadly. Many in the transgender community have the rare experience of being perceived as male and as female at different times in their lives. These life experiences offer researchers a kind of quasi-natural experiment to explore how the economic outcomes of an individual changes

[2] US news and opinion media now commonly hosts political and policy debates around transgender people serving in the US Military, accessing bathrooms, and healthcare discussions around medical transition (Billard, 2016; Capuzza, 2016; Westbrook and Schilt, 2014).

☆ I would like to thank Christopher Jepsen, Ian Burn, Christopher Carpenter, Liam Delaney, Kevin Devereux, Paul Devereux, Benjamin Elsner, Gary Gates, Stefanie Haller, David Madden, Matthew Notowidigdo, Sergey Popov, and Lisa Ryan for their assistance and helpful comments on this paper. I am also thankful to the participants of the EALE SOLE AASLE World Conference 2020; the PhD economics seminar series, University College Dublin; the 2019 Irish Postgraduate and Early Career Economics Workshop, NUI Galway; and the 2019 Conference on the Economics of Sexual Orientation in Linnaeus University, for their comments and suggestions. I acknowledge funding from the Irish Research Council.

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[1] See Klawitter (2015) for a meta-analysis of the literature on the relationship between sexual orientation and earnings.

https://doi.org/10.1016/j.labeco.2021.102006
Received 30 September 2020; Received in revised form 14 April 2021; Accepted 15 May 2021
Available online xxx

as society's perceptions of their gender switches. However, quantitative research on the transgender population has been hampered by a lack of data sources. This paper is among the few to analyse empirically the relationship between minority gender identity status and labour market outcomes. I contribute to the existing literature by providing new descriptive evidence on the associations between transgender identity and labour market outcomes using the 2015 United States Transgender Survey (USTS).

The USTS is the largest and most detailed social survey of transgender adults ever conducted with over 27,000 respondents.[3] This large sample size, together with the USTS' exceptionally detailed gender identity information allows me to analyse and compare the labour market outcomes of four separate minority gender groups: (1) MTFs ('male-to-female', trans women); FTMs ('female-to-male', trans men); (3) AMAB GQNBs (assigned male at birth, genderqueer non-binary identifying); and (4) AFAB GQNBs (assigned female at birth, genderqueer non-binary identifying).[4] The USTS contains much richer data on the lives and transition experiences of transgender people than earlier studies, allowing me to explore potential underlying mechanisms for differences in labour market outcomes among sub-groups of transgender individuals.

I use the 2015 American Community Survey (ACS) sample to estimate income and employment gaps between the wider non-transgender population and each of the minority gender identities in the USTS. Compared with similarly situated ACS men, all trans groups have significantly lower incomes, are more likely to be living near or below the poverty line, unemployed and, conditional on being in employment, are more likely to be working part-time.

Across transgender groups, income is negatively correlated with trans people who have transitioned but do not 'pass' as their gender identity. Next, I estimate outcome gaps between the two main transgender categories: (1) genderqueer non-binary people who were assigned male or female at birth (i.e. AMAB GQNBs and AFAB GQNBs) and (2) trans men and trans women (i.e. FTMs and MTFs). I find that, within each of these groups, those who were assigned female at birth (AFAB) have lower incomes and are more likely to be in part-time work than their similarly situated counterparts who were assigned male at birth (AMAB).

The USTS sample contains a diverse range of trans people with a wide range of information on respondents' gender identity, life experiences, and stage of transition. To my knowledge, this is the first paper to use this information and explore some of the potential reasons for differences in the labour market outcomes of trans people. I identify significant heterogeneity in the outcomes of trans people by their transition status, the degree to which they are 'out' as transgender, and the age at which they began living as their current gender identity rather than their assigned sex.

I find that the incomes of those in the trans (FTM and MTF) group are sensitive to the age at which they transition or begin living full-time as their gender identity. Transitioning to living full-time as your gender identity at a younger age is associated with higher incomes for FTMs and lower incomes for MTFs. Thus, the younger trans people transition, the more their income profiles reflect their gender identity rather than the sex they were assigned at birth. These results provide descriptive evidence in support of a traditional cisgender pay gap, with 'maleness' being associated with an income premium over 'femaleness' in the workplace. Overall, the results of this paper demonstrate that quantitative research which treats the transgender population in a monolithic way risks concealing the significant heterogeneity associated with the economic outcomes of different minority gender identities and sub-groups within each identity group.

2. Literature review

There has been little quantitative work conducted on the labour market outcomes of transgender people, partly a consequence of poor data availability with a limited number of Federal US surveys only recently beginning to collect data in a more transgender-inclusive manner (FCSM Report, 2016). Instead, researchers have often relied on a number of relatively small convenience samples of transgender people (GenderPAC, 1997; Minter and Daley, 2003; Xavier et al., 2007). Across these samples, transgender people report higher rates of workplace harassment and other employment discrimination, much lower average earnings and higher rates of poverty and unemployment when compared with the wider cisgender population. Similar patterns of discrimination have been documented in Germany in a survey conducted by the Socio-Economic Panel and Bielefeld University, with 43% of transgender respondents reporting having experienced discrimination in their work life over the past two years (Vries et al., 2020).

Conron et al. (2012) provide some of the first estimates of the health and labour market outcomes of transgender respondents to come from a probability based (household) sample using the 2007/09 samples of the Massachusetts Behavioral Risk Factor Surveillance System (MA-BRFSS). The MA-BRFSS survey asked if respondents identified as transgender but did not collect any further information regarding their gender identity or assigned birth sex. As a result, the authors are unable to distinguish between different groups within the transgender population. They find that transgender respondents were significantly more likely to be unemployed (odds ratio = 3.2) and living below the poverty line (odds ratio = 3.1) compared to their cisgender counterparts. Leppel (2016) uses the 2008 National Transgender Discrimination Survey to document higher unemployment rates among trans men and trans women compared with the wider US population. Additionally, trans men and trans women are significantly more likely to report being out of the labour force (rather than employed) when other people are able to tell that they are transgender.

Carpenter et al. (2020) use representative data from 35 states in the US Behavioral Risk Factor Surveillance System (US-BRFSS), which has over 2100 transgender identifying individuals, to provide evidence on their socioeconomic outcomes. When compared with similarly situated cisgender men, the authors find evidence of significantly worse outcomes for MTFs and FTMs in the form of lower household incomes, higher poverty rates, and lower employment rates. Their paper is also among the first to provide quantitative evidence on the labour market outcomes of genderqueer non-binary (GQNB) individuals.[5] GQNBs have significantly lower employment rates than cis-men, although their household incomes did not differ significantly.

In a recent Swedish fictitious job applications correspondence study, Granberg et al. (2020) provide some of the first experimental evidence documenting negative outcomes in the hiring process associated with transgender identity status. MTFs and FTMs were significantly less likely to get a positive employer response compared with cisgender individuals in male-dominated and female-dominated occupations, though not in mixed occupations. These findings suggest that transgender individuals face higher barriers to labour market entry.

Geijtenbeek and Plug (2018) use a large administrative panel data set from the Netherlands to identify a subset of MTFs and FTMs who: (1) are on hormone replacement therapy, (2) have had gender confirmation surgery and (3) have gone through the administrative process of legally changing their gender. The authors find that, following transition, a statistically significant earnings decrease is experienced by MTFs (-11%) while there are no significant changes to the earnings of FTMs. This finding is consistent with Schilt and Wiswall (2008) who compared the earnings of a small number of MTFs and FTMs as they medically tran-

[3] The USTS sample of over 27,000 transgender individuals equates to an estimated 2% of the total adult US trans population.

[4] See A.1 for a full glossary of relevant lesbian, gay, bisexual, transgender, queer and other (LGBTQ+) terms.

[5] However, the US-BRFSS does not differentiate among GQNBs by assigned birth sex.

sitioned. They found that there was a statistically significant decrease of -12% in earnings following MTFs transitioning from male-to-female and an insignificant increase of +7.5% for FTMs following their transition from female-to-male. Both of these papers provide evidence consistent with a traditional cisgender pay gap, with 'maleness' enjoying an earnings premium over 'femaleness' in the workplace. These findings also jibe with qualitative research on FTMs experiences of transitioning while in the workplace, where they report feeling more respected and their human capital more highly valued following transition to male (Connel, 2010; Dozier, 2005; Schilt, 2006).

There is a growing literature exploring the impact of prejudice, negative stereotypes and stigma on the socioeconomic outcomes of gay and lesbian individuals. Negative public attitudes towards homosexuals are associated with lower employment for gay men and lesbian women as well as lower earnings for gay men in Sweden (Hammarstedt et al., 2015), while increases in the share of individuals who are prejudiced toward homosexuals is correlated with a decrease in the wages of gay men in the US (Burn, 2020). There is significant levels of prejudice towards the transgender community in the US. Polling data from YouGov (2015) finds that 31% of US adults think it is morally wrong to identify with a gender different from the gender assigned at birth (i.e. to be transgender) while 20% of those polled would not change the pronouns they use to address a trans person. Given this widespread negative sentiment against transgender people in the US, one may expect significant labour market differences between transgender individuals and the wider cisgender population.

This paper makes contributions to the existing quantitative literature on the economic outcomes of the transgender population by incorporating a much larger sample of transgender respondents, and a more diverse range of minority gender identities who are at all stages of transition. In addition to trans men and trans women, I identify two groups of genderqueer, non-binary individuals categorised based on the sex they were assigned at birth. I also take advantage of information provided in the United States Transgender Survey around gender identity, medical/social transition and how respondents are perceived by others in their day-to-day lives to explore some of the possible underlying mechanisms for differences in labour market outcomes between different minority gender identities.

3. Data

3.1. United States Transgender Survey

To explore the relationship between labour market outcomes and transgender identity, I use the 2015 United States Transgender Survey (USTS). The USTS is the largest social survey of transgender adults ever conducted with a sample size of 27,715 respondents - all of whom identify as transgender.[6] The USTS was designed to address the limited survey evidence currently available on the transgender population and to help inform policy discussion on issues impacting trans people in the US. It collected a broad range of data on the lives and experiences of transgender people across 324 possible questions covering 32 sections including employment, education, health, gender identity, and transition processes. The USTS is a single cross-sectional survey, limited to those aged 18 and older, currently residing in a US state, territory, or military base overseas.

The USTS allowed all respondents to self-identify themselves as transgender, thus enabling a much wider representation of the transgender population who are at various stages of transition to be included. The USTS contains information regarding respondents' assigned birth sex, gender identity, gender expression, stage of transition, and how they are perceived by others. A number of previous studies have relied upon surveys with less detailed gender identity information or various legal, hormonal and surgical transition procedures to identify transgender people. Doing so excludes sections of the transgender community who fail to meet the criteria necessary to be counted. Not all transgender people choose to undergo medical transition processes. Transitioning can be prohibitively expensive for many, while others may simply not wish to undergo significant medical intervention. This is particularly true for those who identify as genderqueer or non-binary.

3.1.1. Identifying minority gender groups

All USTS respondents answer a question relating to the sex they were assigned at birth (on their original birth certificate), indicating whether they were assigned male at birth (AMAB) or assigned female at birth (AFAB). Respondents also indicate a primary identity which best describes their current gender identity from a list of six possibilities: crossdresser; woman; man; trans woman (MTF); trans man (FTM); and genderqueer/non-binary (GQNB). Using these two pieces of information, one can identify four minority gender identities split into two broad groupings:

1. Transgender individuals:
   i. MTFs ('male-to-female', trans women): any respondent who was AMAB but identifies as either a woman or a trans woman ($n = 9,238$).
   ii. FTMs ('female-to-male', trans men): any respondent who was AFAB but identifies as either a man or a trans man ($n = 7,950$).
2. Genderqueer Non-Binary (GQNB) individuals:[7]
   i. AMAB GQNBs: any respondent who was AMAB but identifies with a genderqueer or non-binary gender identity ($n = 1,925$).
   ii. AFAB GQNBs: any respondent who was AFAB but identifies with a genderqueer or non-binary gender identity ($n = 7,844$).

3.1.2. USTS representativeness / external validity

Given its length, the USTS was carried out exclusively online using skip logic, ensuring respondents only received questions relevant to them. Online surveying methods are among the most effective ways of sampling marginalised populations (Weir et al., 2012). Miner et al. (2012) specifically argues for the use of online surveying to reach a broad sample of the transgender community. Non-probability sampling methods including direct outreach programmes, modified venue-based sampling and snowball sampling techniques were all used to recruit respondents (James et al., 2016). There are approximately 1.4 million transgender adults in the US (Flores et al., 2016), meaning the USTS sample of 27,715 people represents approximately 2% of the total adult transgender population. For context, a survey of 2% of the US population would contain approximately 6.6 million respondents.

The large sample size and granular information on transgender status available in the USTS makes it a unique data source in examining the heterogeneity in labour market outcomes among different sub-groups of the transgender community. However, the use of non-probability sampling methods raises representativeness concerns. For example, perhaps those facing more discrimination are more likely to take part in the USTS which was designed to gather information for trans policy discussions. If so, the income gap between transgender and non-transgender groups would be an upper bound estimate. The degree to which results using USTS data can be generalised to the wider transgender population is difficult to determine.

After the USTS was conducted, the Behavioral Risk Factor Surveillance System (BRFSS) began collecting transgender identity information, allowing for respondents to be identified as either MTFs, FTMs,

[6] The USTS defined transgender in its broadest sense to incorporate transgender, trans, genderqueer, and non-binary identities.

[7] GQNB is used to describe all those whose gender does not align with the male/female gender binary. These gender identities may have a mixture of masculine and feminine traits and may be fixed or fluid. Given this, the AMAB and AFAB GQNB groups are more heterogeneous than the MTF and FTM groups in their gender expression, medical/surgical transition needs and preferred gender pronouns.

or GQNBs. The BRFSS is an annual US health survey organised by the Centers for Disease Control and Prevention, and administered by participating state health departments. It is designed to give samples representative of the population at the state level. From the 2014 to 2016 waves of the BRFSS, 31 states asked identical questions about transgender identity status in at least one survey year. Each wave of the BRFSS contains only small numbers of trans people so I combine the 2014, 2015, and 2016 waves of the BRFSS to get a reasonable final sample of 1592 transgender people. To gain traction on the representativeness of the USTS, I restrict the USTS sample to those living in the same states as the BRFSS, and present descriptive statistics comparing the standard demographic characteristics of these two transgender samples.[8] Compared with BRFSS trans respondents, the USTS sample is significantly younger, more likely to be white, more likely to have a college degree, more likely to self-report good health, more likely to be employed, and more likely to have an individual income over $50,000.[9]

Whatever the direction of USTS selection bias, if such selection effects operate equally across transgender identities, then this will not bias outcomes gaps estimated between different transgender groups within the USTS. The comparison between USTS/BRFSS trans samples suggests that younger, more educated and affluent transgender people are over-represented in the USTS. Such selection bias would results in a lower bound estimate of the income gap between transgender and non-transgender groups.

The USTS provides several survey weights which adjust the age, education, and racial makeup of the sample to be more representative of the wider US population using the American Community Survey. However, re-weighting the USTS to be representative of the non-transgender populations' demographics does not necessarily address the non-random sampling of transgender people in the USTS. Instead, I re-weight the USTS relative to the BRFSS transgender population using inverse probability weighting weights which adjust the age, race, and education characteristics of the USTS sample to those of the BRFSS sample.[10] All results in the main text apply these weights to the USTS sample. Although there is some concern about the use of weights in economics (Solon et al., 2015), the results of this paper are robust to the use of USTS-provided weights and to estimating unweighted results.

3.1.3. Other USTS concerns

It is important to control for group differences in geographic location when geography is correlated with the economic outcome. For example, if attitudes towards transgender people are more positive in cities, then we might expect transgender people to be over represented in urban areas. The existing data suggests that approximately 16% of transgender people live in an urban area, which is the same as the heterosexual cisgender population (Badgett et al., 2019). The USTS did not ask about the urban or rural status of respondents. However, MAP (2019) was given access to USTS respondents ZIP codes, generated a proxy rural indicator, and estimated that approximately 6% of the sample lived in rural areas. The analysis in this paper can only control for state of residence. However, failing to account for USTS transgender geographic sorting into urban areas would likely bias the estimated income gap between transgender and cisgender individuals downwards, because average income is higher in urban areas.

Occupational sorting has been proposed as one explanation for the differences in labour market outcomes by sexual orientation, where gay men select into lower wage female-dominated industries, and lesbian women select into higher wage male-dominated industries.[11] The USTS does not collect occupation or industry data on respondents, which is a potentially important control to include when estimating labour market outcome gaps between gender groups.

To my knowledge, there are no national surveys on transgender individuals which collect occupation or industry information. The degree to which occupational sorting may drive labour market outcome gaps among transgender groups is not known. However, evidence from a related strand of literature on sexual orientation earnings gaps suggests that estimates are not particularly sensitive to the inclusion or exclusion of occupation controls (Antecol et al., 2008; Jepsen and Jepsen, 2017; Klawitter, 2015).

3.2. Descriptive statistics

Table 1 presents descriptive statistics of the key demographic and economic characteristics used in my analysis from the 2015 USTS data set. The sample is restricted to those aged 18–65, and I report the weighted means and standard deviations for each variable separately by minority gender identity: (1) MTFs (male-to-female, trans women); (2) FTMs (female-to-male, trans men); (3) AMAB GQNBs (assigned male at birth, genderqueer non-binary identifying); and (4) AFAB GQNBs (assigned female at birth, genderqueer non-binary identifying).[12]

Compared with their respective Trans/GQNB group counterparts, MTFs and AMAB GQNBs are both significantly older, more likely to be white, have fewer adults living in the household, are less likely to have children, are more likely to self-report good health, and are more likely to be single, never married.[13] More AMAB GQNBs have a college degree, and fewer MTFs report having family who are supportive of their transgender status.[14] The 'poverty' indicator is generated by the authors of the USTS and captures the portion of respondents living near or below the poverty line as defined by the US Census Bureau.[15] AMAB GQNBs are significantly less likely to be living near/below the poverty line compared with AFAB GQNBs.

The USTS allows respondents to self-identify their sexual orientation. In general, people identify with the sexual orientation that corresponds to their gender identity rather than the sex they were assigned at birth.[16] A minority of all transgender groups identify as heterosexual, but heterosexuality is more common amongst MTFs and FTMs (23/31%) compared with AMAB and AFAB GQNBs (15/1%). Given that heterosexuality is a binary construct, it is unsurprising that non-binary identities identify with it least.

The 2015 average unemployment rate in the US was 5.3%. The unemployment rate across transgender groups in this sample is significantly higher (9-16%). The main outcome of interest in this paper is

[8] See the first two results column of Table A.5 in A.2.1.

[9] The differences between the USTS and BRFSS trans samples are the same when comparing MTFs, FTMs, and GQNBs separately.

[10] In particular, I estimate a logistic regression model on a treatment variable, T, where $T = 1$ if respondents are in the BRFSS trans sample, and $T = 0$ if USTS respondent living in a BRFSS state. I control for age, five race/ethnicity indicators (White, Black, Hispanic, Asian, Other), and three education indicators (≤ High School, Some College, ≥ College Degree). The probabilities of treatment or propensity scores, p, are then calculated and weights for the average treatment effect on the treated are generated – BRFSS respondents assigned a weight of 1, and USTS respondents assigned a weight of $\frac{p}{1-p}$.

[11] In the economics of sexual orientation literature, gay men consistently earn less, and lesbian women tend to earn more, than their respective heterosexual counterparts.

[12] The equivalent unweighted descriptive statistics are presented in A.2.2., Table A.6.

[13] The gender of spouses in the USTS is not known, and I cannot distinguish between those who are legally married but functionally separated. Therefore, I include a 'single, never married' indicator capturing those who have never been married *and* are not currently in a relationship.

[14] Respondents rate average family support of their trans status on a 5-point Likert scale. The supportive family indicator includes those reporting a very supportive/supportive family.

[15] USTS income data does not exactly match onto poverty thresholds used by the Census Bureau, resulting in poverty thresholds ranging from 101% to 124% being calculated.

[16] For example, an individual who identifies as a man/trans man/FTM is heterosexual if they are only attracted to women.

Table 1
Descriptive Statistics by Transgender Identity in the USTS, Aged 18–65.

	Trans Group		GQNB Group	
	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
Std. Demographics:				
Age	50.1† (12.5)	36.8 (14.4)	44.0* (15.6)	29.0 (12.5)
White	0.74† (0.44)	0.58 (0.49)	0.74* (0.44)	0.57 (0.50)
≤ HS Grad	0.49 (0.50)	0.44 (0.50)	0.38 (0.48)	0.47 (0.50)
≥ College Degree	0.31 (0.46)	0.35 (0.48)	0.37* (0.48)	0.29 (0.46)
Single, Never Married	0.25† (0.43)	0.36 (0.48)	0.28* (0.45)	0.44 (0.50)
# Adults in Household	2.00† (1.09)	2.32 (1.21)	2.32* (1.30)	2.62 (1.25)
Any Children in Household	0.097† (0.30)	0.16 (0.37)	0.12* (0.32)	0.22 (0.41)
Excellent/V.Good Health	0.47† (0.50)	0.41 (0.49)	0.48* (0.50)	0.33 (0.47)
Supportive Family	0.47† (0.50)	0.56 (0.50)	0.31 (0.46)	0.29 (0.45)
Unsupportive/Neutral Family	0.35 (0.48)	0.32 (0.46)	0.25 (0.43)	0.28 (0.45)
Heterosexual	0.23† (0.42)	0.31 (0.46)	0.15* (0.36)	0.011 (0.10)
Surgical Transition	0.29† (0.46)	0.45 (0.50)	0.071* (0.26)	0.11 (0.32)
Economic Characteristics				
Employed	0.59 (0.49)	0.61 (0.49)	0.63 (0.48)	0.56 (0.50)
Unemployed	0.092 (0.29)	0.11 (0.32)	0.10* (0.30)	0.16 (0.36)
Out of Labour Force	0.31 (0.46)	0.27 (0.44)	0.27 (0.44)	0.28 (0.45)
Poverty	0.26 (0.44)	0.29 (0.45)	0.24* (0.43)	0.38 (0.48)
Conditional on being in employment				
Avg. Income ('000s $)	53.55† (42.68)	38.13 (34.90)	47.90* (43.50)	26.96 (31.90)
Working Part-Time	0.14† (0.35)	0.31 (0.46)	0.26* (0.44)	0.42 (0.49)
Not Out (at work)	0.25 (0.43)	0.21 (0.41)	0.44 (0.50)	0.40 (0.49)
Outness:				
Not Socially Transitioned:				
Out	0.16† (0.37)	0.10 (0.30)		
Not Out	0.17† (0.38)	0.06 (0.23)		
Socially Transitioned & Passing:				
Out	0.23† (0.42)	0.46 (0.50)		
Not Out	0.06† (0.23)	0.14 (0.34)		
Socially Transitioned & Not Passing	0.38† (0.49)	0.25 (0.43)		
N	8626	7696	1843	7539
(N | in employment)	5581	5014	1187	4240

Notes: Weighted means (standard deviations). USTS, United States Transgender Survey; MTF, male-to-female (trans women); FTM, female-to-male (trans men); AMAB GQNB, assigned male at birth genderqueer non-binary; AFAB GQNB, assigned female at birth genderqueer non-binary. † indicates that means in column (1) MTFs and column (2) FTMs are significantly different from one another at $p < .01$. * indicates that means in column (3) AMAB GQNBs and column (4) AFAB GQNBs are significantly different from one another at $p < .01$.

'total combined individual income' (before taxes) received by each respondent in the previous year. Respondents indicate which one of seventeen possible intervals into which their income fell, ranging from '$\leq \$5,000$' to '$\geq \$150,000$'. This income measure includes all money received from jobs, employment, net income from business, income from farms or rentals, income from self-employment, pensions, dividends, interest, social security payments, and other money income individuals personally received. Money received through government SNAP or WIC programmes are not counted as income. Recent research on the incomes of the transgender population in the US has relied on an eight category household income question from the BRFSS survey. I cannot identify specific employment wages, but using the USTS individual income information is still a strength over much of the existing literature. Restricting the sample to those in employment, MTFs and AMAB GQNBs have significantly higher individual incomes than FTMs and AFAB GQNBs, respectively.

When restricting the sample to those in employment, the dummy variable 'Not Out' captures the portion of each transgender group who report having not disclosed their minority gender identity status to any current bosses and/or co-workers. 21–25% of the Trans grouping, and 40–44% of the GQNB grouping have not disclosed their minority gender status at work. Compared with GQNBs, MTFs and FTMs are more clearly transitioning from male-to-female or female-to-male. Therefore, they can be 'out' or 'not out' as transgender at work under very different circumstances, depending on their stage of transition, the gender they are presenting as on a daily basis, and how this presentation is perceived by others. For example, an MTF may not have disclosed their transgender status at work because they have not transitioned and are still presenting and outwardly identifying as male, or because they have fully transitioned to presenting and passing as female. Such differences within the MTF and FTM groups are potentially meaningful in determining labour market outcomes, and are not captured by a single 'not out' indicator.

To account for these different 'types' of MTFs/FTMs within the 'not out' indicator, I begin by distinguishing between those who have and have not socially transitioned. For this paper, I define socially transitioning as the portion of MTFs and FTMs who currently live as their gender identity on a day-to-day basis, rather than the sex they were assigned at birth. This means living as women for MTFs, and living as men for FTMs. I further distinguish among those who have socially transitioned based on whether they are perceived as their gender identity, rather than their assigned sex, by others in society (i.e. whether or not they 'pass' as their gender identity, following socially transitioning). Specifically, I say that respondents are being perceived as their gender identity by others ('passing') if they live as their gender identity on a day-to-day basis *and* report that people can 'never' or 'rarely' tell that they are trans, even if they do not tell them. Using these pieces of information, I categorise MTFs and FTMs by their 'social transition status', into those

who have: 'not socially transitioned'; 'socially transitioned & passing'; or 'socially transitioned & not passing'.

I combine the 'not out'/'out' at work indicator with these social transition statuses to create a five-category 'Outness' variable for those who have: not socially transitioned but are (1) out or (2) not out as transgender at work; those who have socially transitioned, are passing and are (3) out or (4) not out as transgender at work; and finally, (5) those who have socially transitioned but do not pass.[17]

A third of MTFs have 'not socially transitioned' to living as female, with approximately equal numbers of them reporting being 'out' (16 pp) and 'not out' (17 pp) as transgender at work. Compared with MTFs, significantly fewer FTMs have 'not socially transitioned' to living as male (16%) with slightly more being out (10 pp) than not out (6 pp) as transgender at work. Colleagues of these 'not out' groups of MTFs and FTMs who have not socially transitioned are likely perceiving them as being cisgender men and women, respectively, based on the sex they were assigned at birth. 29% of the MTF sample report transitioning to, and passing as female, of which 6 percentage points have not disclosed their transgender status at work. These MTFs are likely being perceived as cisgender women by colleagues. 60% of FTMs report having socially transitioned to, and passing as, men. Of these, 14 percentage points have not disclosed their transgender status at work and are likely to be perceived as cisgender men by colleagues. A plurality of the MTF sample (38%) have socially transitioned to, but are not passing as, female. Fewer FTMs (25%) have socially transitioned to, but are not passing as, men. The significantly smaller portion of FTMs who are not passing compared with MTFs is somewhat surprising given that the FTM sample is younger, but is perhaps partly a function of the significantly higher rates of surgical transition among FTMs (45%) compared with MTFs (29%).[18]

3.3. American Community Survey

In addition to estimating differences in the economic outcomes between different transgender identities, I want to estimate outcome gaps between transgender and the wider non-transgender (i.e. cisgender) population. A limitation of the USTS is that it did not survey cisgender individuals. Consequently, I use the 2015 American Community Survey (ACS) sample of men and women as the majority reference groups against which I estimate the economic outcomes gaps of transgender individuals in the USTS.

The USTS questionnaire was designed to match closely with other large US national social surveys like the ACS so as to allow for the easier comparison of USTS respondents with the wider cisgender population. Some ACS respondents may be transgender. However, given that the ACS is a random sample of the US population and >99% of the population are estimated to be cisgender, this is unlikely to be a problem. Definitions of the standard demographic and employment variables are equivalent across ACS and USTS samples. Personal income in the ACS is defined as total pre-tax income from all sources in the previous year. ACS personal income is equivalent to individual income in the USTS, with the exception that USTS income does not include income from SNAP/WIC welfare sources.[19] For cross-survey compatibility, I restrict the ACS sample to all those aged 18–65 and present the descriptive statistics for ACS men and women in Appendix A.2.3, Table A.7.

[17] Most of this fifth group of MTFs and FTMs also report being out as transgender at work. While counter-intuitive, a small fraction (<2%) report not passing but also being not out at work. One may think of these cases as being functionally out, despite reporting otherwise. Therefore, I group those who report being "out" or "not out" and having "socially transitioned & not passing" together.

[18] The wider demographic literature on transgender people also finds that FTMs request sexual reassignment surgery at a younger age than MTFs (Simonsen et al., 2015).

[19] All results using these income variables are robust to the exclusion of those in receipt of any welfare income.

4. Methodology

4.1. Interval regression

The USTS provides total combined individual yearly income data which are interval censored into 17 categories. Categorical income data pose a problem for standard OLS regression or decomposition analyses where the dependent variable (income) is assumed to be continuous. A common approach to operationalise this type of interval income data is to generate a pseudo-continuous variable by setting each respondents' income equal to the midpoint of the interval indicated (for example, Almeida-Santos and Mumford 2005). However, this midpoint estimation method is unlikely to yield consistent estimates unless one assumes that incomes are uniformly distributed across the population (Stewart, 1983). Since the natural logarithm of income is approximately normally distributed, taking the midpoint of the bands below (above) the overall mean of the earnings distribution will underestimate (overestimate) the true mean within these bands.

Instead, I use interval regression methods which have been widely adopted when analysing interval censored income data (for example, Carpenter 2008; Gerry et al. 2004; Gibson and Stillman 2009). Interval regression is a generalisation of censored regression, estimated using maximum likelihood. By assuming the dependent variable has a normal distribution, interval regression fits models using any mixture of point, interval, left-censored, or right-censored observations.

The true income value (Y_i^*) of each USTS respondent lies somewhere within a lower (m_i) and upper (M_i) bound.[20] The likelihood contribution of this is:

$$P(m_i \leq Y_i^* \leq M_i)$$

Assume that the latent structure of the model is:

$$Y_i^* = X_i\beta + \varepsilon_i$$

This model can be estimated using standard maximum likelihood methods once a normal distribution is imposed on the error term, ε_i. Let all observations $i \in I$ be interval income data and all observations $i \in C$ be right-censored income data. Where $\Phi()$ is the cumulative normal, the log likelihood function becomes:

$$lnL_i = \sum_{i\in I} ln\left\{\left(\frac{M_i - x_i'\beta}{\sigma}\right) - \Phi\left(\frac{m_i - x_i'\beta}{\sigma}\right)\right\} + \sum_{i\in C} ln\left\{1 - \Phi\left(\frac{m_i - x_i'\beta}{\sigma}\right)\right\}$$

By including a gender indicator variable in these regressions, I can estimate the associated income gap between two similarly situated gender groups.

4.2. Decomposition analysis

A limitation of estimating income gaps via gender group indicators within the same income regression is that they assume the returns associated with each of the control variables are equal across groups. The estimated income gap for a given gender is assumed to be entirely captured by the intercept. There is reason to believe that the labour market returns to various characteristics are different across different sections of the working population. For example, marriage tends to be associated with a pay premium for men but a penalty for women (Leonard and Stanley, 2015).

Oaxaca (1973) and Blinder (1973) first popularised mean decomposition methods (henceforth 'OB decomposition') in economics to explore the factors which contribute to a mean difference in a given outcome variable between two groups.[21] OB decomposition methods impose less structure on such models by allowing the coefficients on all explanatory variables in a regression model to differ across identity groups.

[20] In the case of right-censored income data, we only know that the true value lies above the lower bound (m_i)

[21] See Jann (2008) for a detailed summary of OB style decomposition methods.

Suppose one has two mutually exclusive social groups ($i = 1, 2$), with the natural logarithm of individual income as the dependent variable (Y_i), which is a function of various characteristics (X_i):

$$Y_i = X_i\beta + \varepsilon_i \qquad (i = 1, 2)$$

By estimating these income regressions separately for each group, the raw mean income gap between them can be decomposed into the following:

$$\underbrace{\overline{Y}_1 - \overline{Y}_2}_{\text{Income Gap}} = \underbrace{\hat{\beta}_1\left(\overline{X}_1 - \overline{X}_2\right)}_{\text{Explained}} + \underbrace{\overline{X}_2\left(\hat{\beta}_1 - \hat{\beta}_2\right)}_{\text{Unexplained}}$$

The "explained" (endowment/composition) portion of the gap arises from differences in average group characteristics and measures the amount of the gap that would be closed were both groups to have the same characteristics. The "unexplained" (price/coefficient) portion is the part of the gap which remains unaccounted for by these different average endowment levels. Instead, it is the portion of the gap that would be closed were group 2's returns to each characteristic identical to the reference structure of group 1.

The optimal reference income structure is one which accurately estimates the non-discriminatory returns to characteristics important in determining income. In gender pay gap studies, men are usually chosen as the reference group against which women's earnings are compared (Biltagy, 2014; Oaxaca, 1973; Zajkowska, 2013), while white people are usually chosen as the reference group when estimating racial/ethic pay gaps in the US (Longhi et al., 2013; Mandel and Semyonov, 2016). Alternative measures take account of scenarios where the reference wage structure may not equal either group. For example, Neumark (1988) advocates for the estimation of the non-discriminatory reference wage structure using the coefficient vector estimated from a wage regression having pooled the two groups of interest.[22]

Whatever the method of estimating the reference income structure, β_i^*, the OB decomposition for two groups (1 and 2) becomes:

$$\underbrace{\bar{Y}_1 - \bar{Y}_2}_{\text{Income Gap}} = \underbrace{\hat{\beta}^*(\bar{X}_1 - \bar{X}_2)}_{\text{Explained}} + \underbrace{[\overbrace{\bar{X}_1(\hat{\beta}_1 - \hat{\beta}^*)}^{\text{Advantage}} + \overbrace{\bar{X}_2(\hat{\beta}^* - \hat{\beta}_2)}^{\text{Disadvantage}}]}_{\text{Unexplained}}$$

The first term on the right hand side of this equation represents the "explained" portion of the raw income gap – the part explained by differences in average group characteristics evaluated at the returns on the non-discriminatory reference wage structure, β^*. The sum of the final two terms is the "unexplained" portion of the gap - the part of the gap that would be closed were the returns of both groups equal to β^*.[23]

When decomposing income gaps between different gender identity groups, I use several reference income structures to estimate a range within which the unexplained portion of each income gap likely lies. This ensures that the significance, direction and magnitude of the estimates from these decompositions are invariant to a wide range of alternative reference income structure specifications.

5. Results and discussion

In Table 2, I estimate separate interval regressions for each gender group identified in the USTS: (1) MTFs; (2) FTMs; (3) AMAB GQNBs; and (4) AFAB GQNBs. The log of individual income is the dependent variable and standard mincearian type controls are included for age, age-squared and indicators for race, education, relationship status, state of residence, health status, part-time worker status, and household size/composition. I present coefficient estimates for disclosure of minority gender identity at work ('Not Out' and 'Outness'), having a family who are supportive of respondents trans status ('Supportive Family'), and minority sexual orientation ('Not Heterosexual'), to explore how the relationship between individual income and these variables of interest differ in magnitude and direction by gender group.

To explore the relationship between income and MTFs/FTMs disclosing their transgender status at work, I include the same five category 'outness' variable discussed previously in Table 1. This variable captures each combination of those MTFs and FTMs who have and have not disclosed their transgender identity status at work (i.e. 'out' or 'not out') and their social transition status (i.e. 'not socially transitioned', 'socially transitioned & passing' or 'socially transitioned & not passing').[24] I use the 'socially transitioned & passing, out' group of MTFs and FTMs as the reference category against which I estimate the association of the other four 'outness' categories on income. The reference group of MTFs (FTMs) are those who have transitioned to living/presenting and passing as women (men) on a day-to-day basis, but have told at least some colleagues at work that they are transgender.

Compared with their reference group counterparts, MTFs who have socially transitioned to women, but do not pass, have incomes which are 15% lower. Similarly, FTMs who have socially transitioned to men, but do not pass, have incomes which are 12% lower than their reference group, on average. The wider social science literature has documented greater negative feelings and prejudice against MTFs compared with FTMs, particularly by cisgender men. The fact that cis-men are often in managerial positions of power within a workplace may lead to additional penalties against MTFs for not passing. Although the point estimate associated with not passing is larger for MTFs than FTMs, this difference is not statistically significant.

MTFs who have not socially transitioned and who are not out as transgender at work are likely being perceived as cisgender men by colleagues. These 'not socially transitioned, not out' MTFs have incomes which are 28% higher than their reference group counterparts and is consistent with these MTFs benefiting from their perceived 'maleness' in the labour market. In contrast, FTMs who have not socially transitioned and who are not out as transgender at work are likely being perceived as cisgender women by colleagues. This group have incomes which do not significantly differ from the reference group of FTMs. For MTFs and FTMs, the estimate on the 'socially transitioned & passing, not out' category indicates that these groups do not have significantly different incomes from their 'socially transitioned & passing, out' counterparts.

The 'outness' coefficients illustrate how people's perceptions of a trans person's gender identity correlates with income. Consistent with discrimination on the basis of simply identifying as a minority gender, MTFs who have not transitioned only benefit from their perceived 'maleness' for as long as they do not tell co-workers of their transgender status. Once MTFs and FTMs have socially transitioned and 'pass' as their gender identity, there are no significant changes in income associated with having disclosed or not disclosed their transgender status. Instead, income penalties are associated with respondents not passing as their gender identity. Although this pattern of results is consistent with discrimination on the basis of outwardly presenting as transgender, transitioning is also costly and simultaneity likely exists between the 'outness' and income variables.

[22] Others have used a vector of the weighted average (according to group sample size) of group coefficients as well as a simple average between the group coefficients as reference income structures (Cotton, 1988; Reimers, 1983).

[23] The "advantage" term is the additional price group 1 is able to extract from their characteristics over and above that which would prevail in a non-discriminatory wage structured world. The "disadvantage" term is the lower returns received by group 2 for their characteristics compared with the reference wage structure.

[24] Respondents are 'not out' at work if they have not told any current bosses and/or co-workers of their transgender status. MTFs (FTMs) have socially transitioned if they live as women (men) on a day-to-day basis. MTFs and FTMs 'pass' if, following socially transitioning, people can never or rarely tell that they are trans, even if they do not tell them.

Table 2
Transgender Identity and Individual Income, USTS, Aged 18–65.

	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
Outness (ref: Socially Transitioned & Passing, Out)				
Not Socially Transitioned, Out	0.06	-0.02		
	(0.08)	(0.09)		
Not Socially Transitioned, Not Out	0.28***	0.06		
	(0.09)	(0.09)		
Socially Transitioned & Passing, Not Out	0.13	0.09		
	(0.11)	(0.08)		
Socially Transitioned & Not Passing	-0.15**	-0.12**		
	(0.07)	(0.05)		
Not Out			0.11	0.05
			(0.10)	(0.06)
Supportive Family	0.14***	0.20***	0.06	0.13**
	(0.05)	(0.05)	(0.10)	(0.05)
Not Heterosexual	0.09	-0.04	-0.37***	0.39
	(0.07)	(0.05)	(0.14)	(0.24)
Additional Covariates	Yes	Yes	Yes	Yes
No. of Observations	5581	5014	1187	4240

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. Sample consists of all those in employment aged 18–65. All models control for age, age-squared, race/ethnicity (indicators for White, Black, Hispanic, Asian, other race), educational attainment (indicators for ≤ high school, some college, college degree), state of residence indicators, an indicator for working part-time, the number of adults in each household, an indicator for children in the household, an indicator for good health (reporting excellent/very good general health). USTS, United States Transgender Survey; MTF, male-to-female (trans women); FTM, female-to-male (trans men); AMAB GQNB, assigned male at birth genderqueer non-binary; AFAB GQNB, assigned female at birth genderqueer non-binary. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Because no shared societal norms exist around living, presenting or passing as genderqueer non-binary, I include a smaller, two-category, 'Not Out' indicator to explore the relationship between income and AMAB/AFAB GQNBs disclosing their minority gender identity at work. This variable captures the portion of each GQNB group who have and have not disclosed their genderqueer non-binary identity to any current colleagues. I find no correlation between income and GQNBs who remain undisclosed about their gender identities at work.

Income is positively correlated with those who have families that are supportive of their transgender status (although the point estimate is insignificant for AMAB GQNBs). This result is unsurprising given that having a supportive family network is likely correlated with many factors which also impact income like lower rates of homelessness and better health outcomes.

In order to capture the relationship between income and identifying with a minority gender identity and a minority sexual orientation, I include a single minority sexual orientation dummy variable ('Not Heterosexual'). This dummy takes on a value of one for all non-heterosexuals and a value of zero for all heterosexuals. This 'Not Heterosexual' indicator is insignificant for all trans groups except AMAB GQNBs where minority sexual orientation is correlated with a 37% decrease in income compared with their heterosexual counterparts. In Appendix C.1, I expand this sexual orientation indicator into four sexual orientation categories (see Table C.9).[25] The detailed minority sexual orientation coefficients are jointly significant for both GQNB groups, with minority sexual orientations correlating with lower income for AMAB GQNBs and higher income for AFAB GQNBs. However, these estimates are imprecise with large standard errors, so one cannot rule out large sexual orientation related income differences across transgender identities.

[25] Heterosexual (reference group), homosexual, bisexual, asexual and other.

5.1. Comparing minority gender identities

In this section, I explore differences in the incomes of different minority gender groups within the transgender sample. I see two obvious ways of categorising the four minority gender groups used in this analysis. First, one can divide these identities into the two broader categories of current gender identity: (1) 'Trans'; and (2) 'GQNB'. The 'Trans' group can be further subdivided into MTFs and FTMs, while the 'GQNB' group can be further subdivided into AMAB GQNBs and AFAB GQNBs. Alternatively, one may categorise these minority genders by the sex they were assigned at birth: (3) 'AMAB'; and (4) 'AFAB'. In this case, the 'AMAB' group can be further subdivided into MTFs and AMAB GQNBs, while the 'AFAB' group can be further subdivided into those who identify as FTMs and AFAB GQNBs. These four within-minority comparison groups are used in my analysis going forward and are illustrated in Fig. 1.

Table 3 presents the results of a series of interval income regression analyses, each using a sample of one of the four groups identified in Fig. 1. An indicator variable is included to capture the estimated income gap between the two minority genders in each model. From model (1), I find that within the Trans grouping, FTMs earn 8% less than similarly situated MTFs. From the GQNB group in model (2), AFAB GQNBs earn 12% less than their AMAB GQNB counterparts. In model (3), AMAB GQNBs earn 14% less than their MTF counterparts (both AMABs), and in model (4), AFAB GQNBs earn 16% less than their FTM counterparts (both AFABs).[26]

Next, I calculate alternative estimates of the income gap between these four minority gender groupings using interval regression based mean decomposition methods (Sinning et al., 2008). For a given mi-

[26] The raw income gaps between these groups, calculated as univariate interval income regressions on the gender indicators, are: FTMs earn 42% less than MTFs; AFAB GQNBs earn 73% less than AMAB GQNBs; AMAB GQNBs earn 22% less than MTFs; and AFAB GQNBs earn 52% less than FTMs, on average.

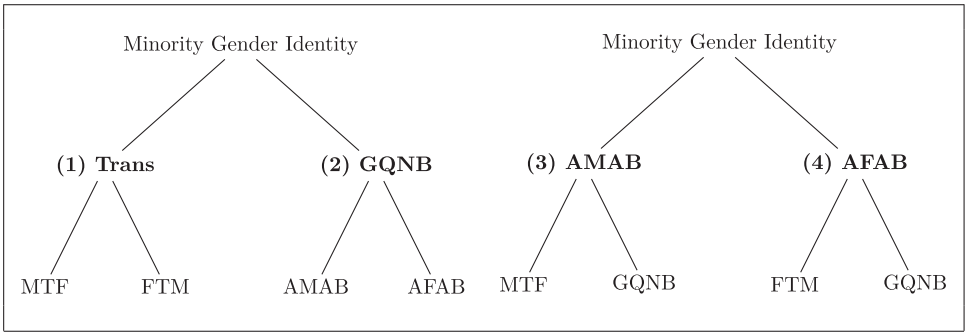

Fig. 1. Grouping Minority Genders in the USTS.

Table 3
Interval Income Regression: Comparing Minority Gender Identities.

	(1)	(2)	(3)	(4)
	Trans	GQNB	AMAB	AFAB
FTM (ref: MTF)	-0.08*			
	(0.04)			
AFAB GQNB (ref: AMAB GQNB)		-0.12*		
		(0.06)		
AMAB GQNB (ref: MTF)			-0.14**	
			(0.07)	
AFAB GQNB (ref: FTM)				-0.16***
				(0.04)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	-0.42***	-0.73***	-0.22***	-0.52***
No. of Observations	10,595	5427	6768	9254

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. The sample consists of all those in employment aged 18–65. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

nority group comparison and reference income structure, I decompose the income gap between the two gender identities into an explained and unexplained portion. The unexplained portion of the income gap is the part which cannot be explained by average group differences in the covariates and is comparable to the gender indicator from the group interval regressions presented previously. Fig. 2 presents a coefficient plot summary of these 'unexplained' portions of the income gap with 90% confidence intervals. Each model is estimated using three different reference income structures: A) $\hat{\beta}^*$ = Pooled Within Model; B) $\hat{\beta}^*$ = Gender Group A of Model; and C) $\hat{\beta}^*$ = Gender Group B of Model.[27] Within the 'Trans' grouping, these estimates indicate that the income of FTMs ranges between 5–19% less than similarly situated MTFs. Within the 'GQNB' grouping, the income of AFAB GQNBs ranges between 9–22% less than AMAB GQNBs. For the 'AMAB' grouping, AMAB GQNBs income ranges 12–15% less than their MTF counterparts, with the exception of one insignificant decomposition estimate.[28] Finally, AFAB GQNBs income ranges 13–26% less than their FTM counterparts in the 'AFAB' grouping.

The range of income gap estimates found illustrate the sensitivity of income gap analyses to the model specification and reference income structures chosen. Nonetheless, with the exception of a single decomposition estimate in the 'AMAB' grouping, I consistently find point estimates of the unexplained portions of the income gap across the decomposition specifications which are qualitatively similar to the interval regression indicator results for each minority gender group comparison in Table 3.

To summarise these regression and decomposition results, when grouped by sex assigned at birth — (3) AMAB and (4) AFAB — the income of those with a genderqueer non-binary identity is significantly less than those with a transgender male/female identity (i.e. *AMAB GQNB* < *MTF* and *AFAB GQNB* < *FTM*). These income gaps are consistent with GQNBs facing additional income penalties from identifying outside of the more socially accepted male/female binary, although the descriptive nature of these results precludes causal inference. Next, within the (1) Trans and (2) GQNB groups, the incomes of those who were assigned female at birth are significantly less than those who were assigned male at birth (i.e. *FTM* < *MTF* and *AFAB GQNB* < *AMAB GQNB*). This relationship is consistent with transgender people, on average, being perceived by those in the labour market as their assigned birth-sex rather than their gender identity. Thus, the unexplained portion of the income gap may partly be a reflection of a traditional (cis)gender income gap relationship.

5.1.1. Alternative economic outcomes

Here, I continue exploring the economic differences between transgender groups by estimating outcome gaps along alternative economic margins. I focus on four binary outcomes: 'Unemployed' (compared with those who are in employment); 'Out of the Labour Force' (compared with those who are in employment); 'Part-Time' employment (compared with those in full-time employment); and 'Poverty' (compared with those not in poverty).[29] Grouping the minority genders into the same four groups as before, I estimate a series of probit regressions using each binary economic indicator as an outcome variables.

In Fig. 3, I present a coefficient plot of the average marginal effects estimates from these probit models estimating within-minority differences in each outcome. Within the (1) Trans group, compared with their MTF counterparts, FTMs are 5 percentage points (pp) less likely to be unemployed, less likely to be living in poverty (6 pp), but more likely to be working part-time (4 pp). Within the (2) GQNB group, AFAB GQNBs are significantly more likely to be out of the labour force (5 pp) and, conditional on being in employment, are more likely to be working part-time (6 pp).

In the (3) AMAB group, there are similar rates of unemployment and poverty, but AMAB GQNB are significantly more likely than MTFs to be in part-time employment (8 pp). In the (4) AFAB grouping, AFAB GQNBs are significantly more likely to be out of the labour force (3 pp), in poverty (3 pp), and working part-time (4 pp), compared with their FTM counterparts.[30]

[27] I include the gender indicator coefficients from the interval regressions in Table 3 in this coefficient plot for comparison.

[28] When using the MTF reference income structure, the sign on the point estimate for the 'AMAB' grouping is reversed and becomes insignificant.

[29] The poverty indicator is provided by the USTS and indicates if a respondent is living near or below the poverty line as defined by the US Census Bureau (2019). Part-time and full-time employment status is self-reported by respondents. Information on hours worked in a given time period was not collected by the USTS.

[30] All results are qualitatively similar when re-estimated using average marginal effects from logistic regression and linear probability models (See C.3).

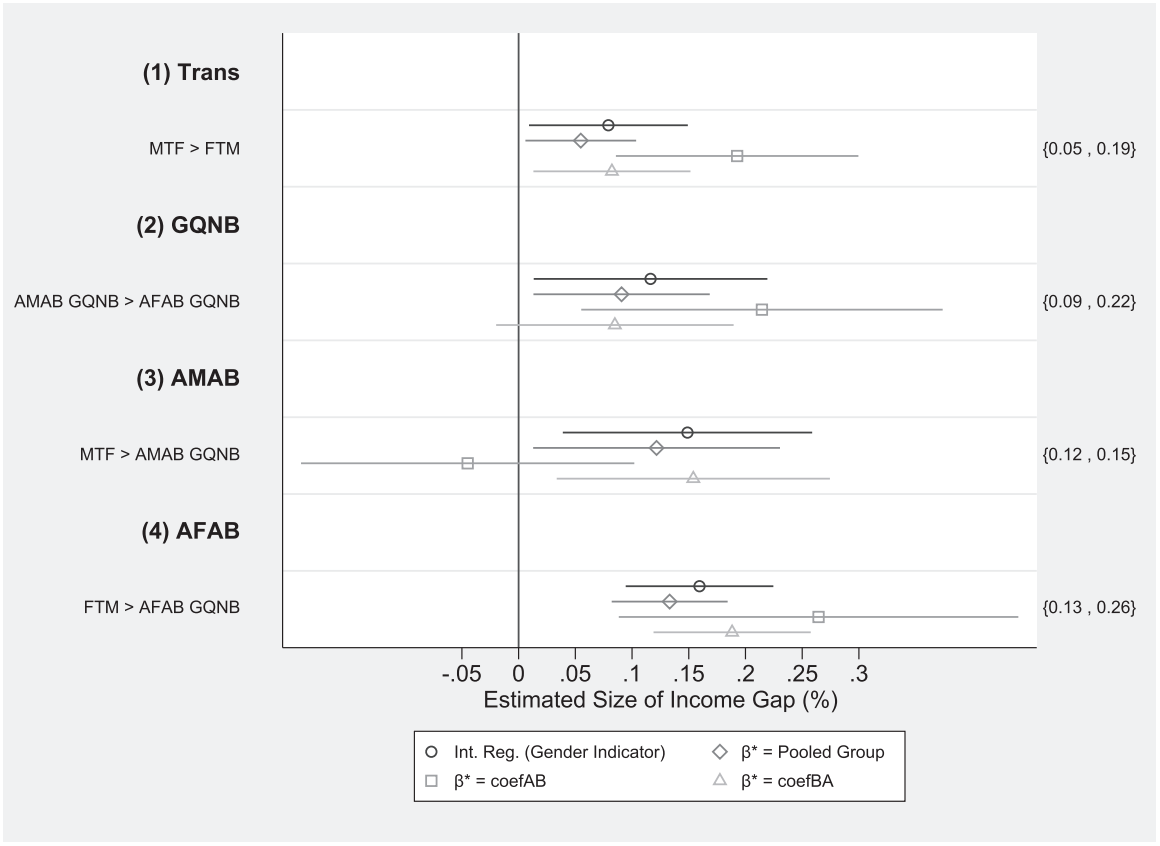

Fig. 2. Decomposition Analysis: Estimates of the Unexplained Portion of the Income Gap between Minority Gender Identities.

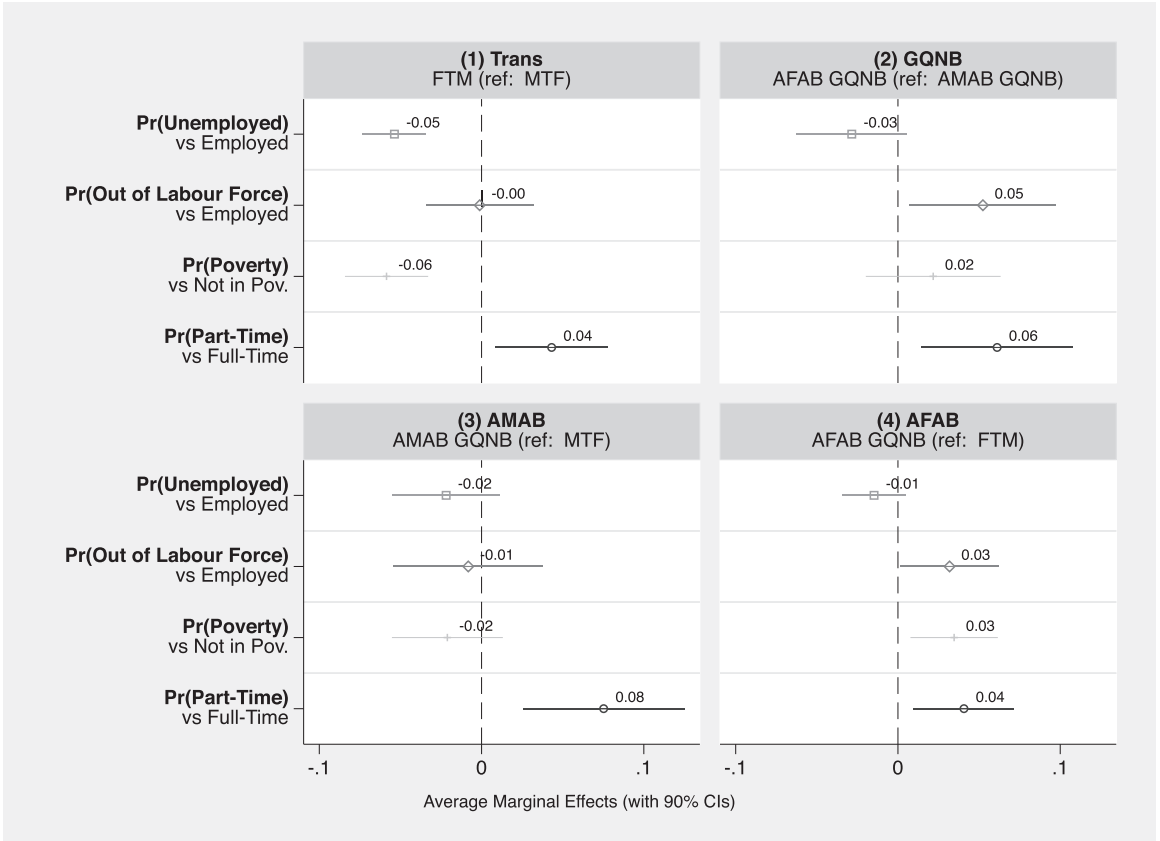

Fig. 3. Comparing Minority Gender Identities - Alternative Economic Margins.

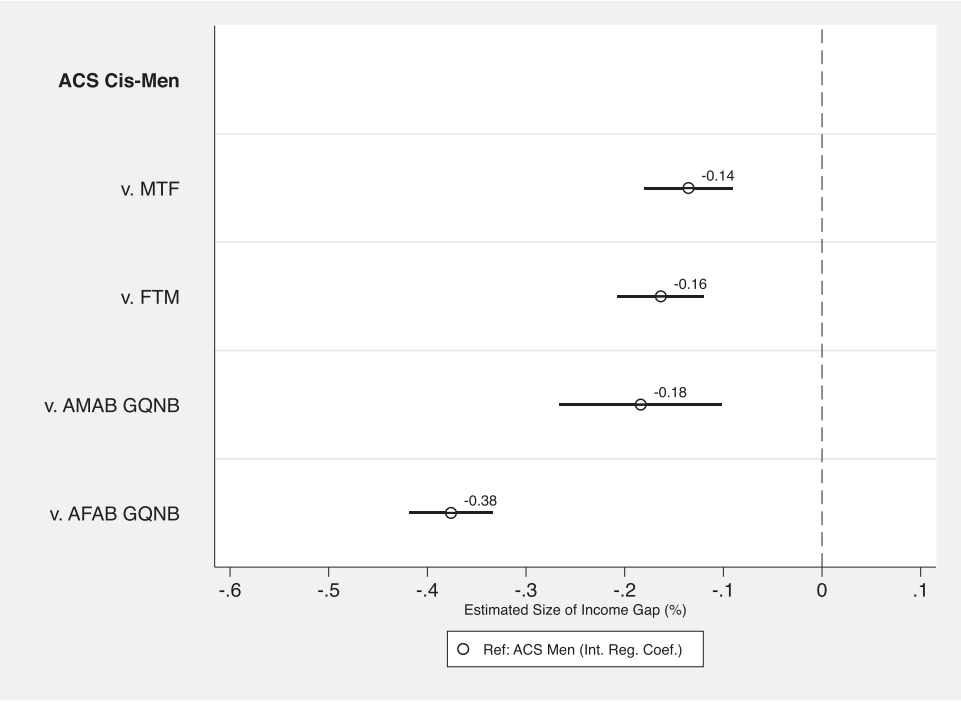

Fig. 4. Interval Income Regression Estimates Comparing ACS Cisgender Men and USTS Transgender Identities.

5.2. Comparing cisgender and transgender identities

In this section, I turn to estimating outcome gaps between transgender individuals and the wider majority cisgender population using a merged sample of the 2015 USTS transgender and 2015 ACS cisgender respondents. If trans people face lower incomes because of their minority status, then we can estimate this by comparing them with a majority group not thought to experience such penalties. Given the literature on discrimination in the labour market against cisgender women, cisgender men are the optimal reference group of non-transgender people to use. I run a series of interval regression models using the log of total individual income as the dependent variable. Each model includes a gender indicator which estimates the percentage change in individual income associated with minority gender identity status (indicator = 1 for one of the minority gender groups) relative to the reference group of ACS cis-men.[31]

Fig. 4 presents a coefficient plot summary of the gender indicator results from these models. Compared with similarly situated ACS cis-men, all minority gender groups have lower individual incomes: -14% and -16% for MTFs and FTMs, respectively; and -18% and -38% for AMAB GQNBs and AFAB GQNBs, respectively.

In Appendix C.4, I re-estimate these income gaps using ACS cis-women as the reference group (see Table C.11). Given the male/female income gap literature, one would expect the income gaps between transgender and ACS women to be smaller. The magnitude of these income gaps reduce but persist for AFAB GQNBs (-22%), and become insignificant for FTMs and AMAB GQNBs, while MTFs have individual incomes which are 8% higher than ACS cis-women. However, the income comparisons with ACS cis-women are sensitive to the model specification and to the inclusion or exclusion of survey weights so I interpret these associations with caution.

5.2.1. Alternative economic outcomes

Next, I extend my analysis comparing ACS cisgender and USTS transgender individuals by estimating outcome gaps along the same alternative economic margins as before (unemployment, out of labour force, poverty, and part-time employment).[32,33] Each transgender group is compared to ACS cis-men in separate probit models. In Fig. 5, I present the average marginal effects estimates from minority gender indicators comparing ACS cis-men to (1) MTFs, (2) FTMs, (3) AMAB GQNBs and (4) AFAB GQNBs.

Compared with ACS cis-men, those assigned male at birth (MTFs and AMAB GQNBs) have similar rates of labour force participation, while those assigned female at birth (FTMs and AFAB GQNBs) are around 4 percentage points more likely to be out of the labour force. Despite similar or lower rates of labour force participation, all transgender groups have higher rates of unemployment (5–8 pp) and, conditional on being in employment, being transgender is correlated with higher rates of part-time work (2–19 pp). All transgender groups have higher rates of poverty (8–16 pp) also. In short, I find that being transgender is correlated with poorer economic outcomes.[34]

6. Additional results

6.1. Age of transition

The study of transgender people offers an interesting opportunity to explore the reasons behind the differential treatment and outcomes of cisgender men and women in the labour market. For example, compared with their female counterparts, men are more likely to be successful in applying for promotions (Blau and Devaro, 2007) and negotiating higher wages (Petrides and Furnham, 2006).

[31] I control for age, age-squared and indicators for race/ethnicity, education, marital status, full-time worker status, household composition and state of residence.

[32] USTS income data only allow for poverty thresholds ranging from 101% to 124% of the actual poverty line to be calculated. I set the ACS poverty threshold to 124% of the poverty line, but results are very similar using an alternative threshold of 101%.

[33] USTS respondents self-identify if they work full-time or part-time. Average hours worked was not collected. In the ACS, I code those working < 35 hours per week as being in part-time employment and those working ≥ 35 hours per week as being in full-time employment. Results are robust to alternative definitions of part-time work (< 40 and < 30 hour work weeks).

[34] These results are qualitatively similar when re-estimated using average marginal effects from logistic regression and linear probability models (see C.5).

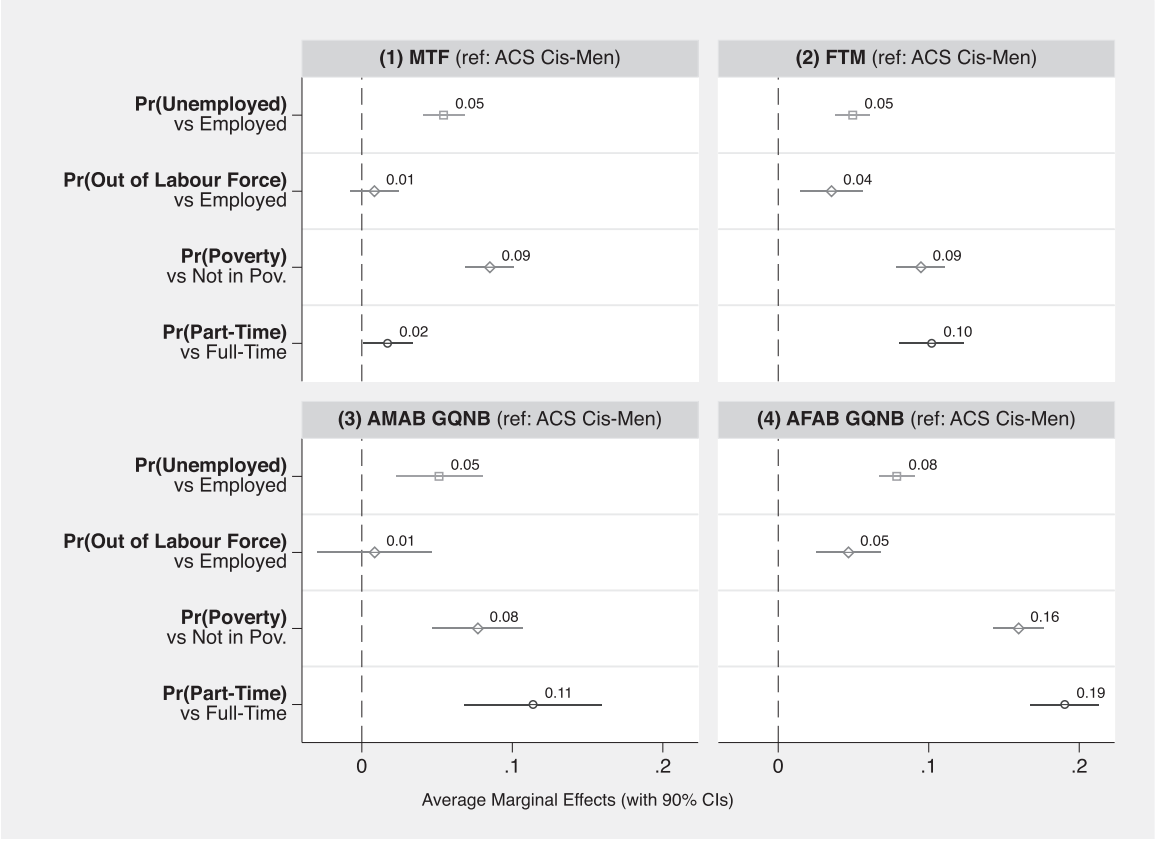

Fig. 5. Comparing ACS Cisgender Men and USTS Transgender Identities - Alternative Economic Margins.

In this section, I test the hypothesis that the incomes of MTFs and FTMs are correlated with the age at which they transitioned from the sex they were assigned at birth to their gender identity. I had previously defined MTFs (FTMs) as having 'socially transitioned' if they report living as women (men) on a day-to-day basis. The USTS did not ask the age at which they began living as this gender identity on a day-to-day basis. Instead, respondents are asked whether or not they *"currently live full-time in a gender that is different from the one assigned to [them] at birth?"*. For those who respond affirmatively to this, they also provide the age that they first began 'living full-time'. In this section, I define a USTS respondent as having fully transitioned if they are 'living full-time'.[35]

Suppose there are greater early labour market gains that come from identifying or being perceived as male in the labour market, which are then consolidated into higher incomes throughout life. Then MTFs who fully transition from male-to-female later in life would have higher incomes (and FTMs lower incomes) than those who do so at an earlier age. When restricting the sample to those who began living full-time as their gender identity later in life, this same mechanism would increase the unexplained income penalty against FTMs compared with MTFs which was previously found in Table 3.

To test this hypothesis, I re-run the standard individual income regression models used previously for MTFs and FTMs, with the addition of a categorical variable for the age each respondent began living full-time as their gender identity. The reference category includes all those who began living full-time as their gender identity up to the age of '≤24 yrs'. Compared with this group, MTFs who transitioned from male-to-female later in life – between 25–29 years, 30–34 years, or ≥35 years – have incomes which are 30%, 43% and 52% more, respectively. In contrast, FTMs transitioning to male later in life is correlated with progressively lower incomes, with those transitioning at ≥35 years having 25% lower incomes than those who transitioned up to 24 years old.[36]

These correlational findings are consistent with MTFs who transitioned early in life being more likely to have entered into the labour market being perceived as women from the start. However, MTFs who enter the labour market outwardly identifying as male, and only transition to female later in life, may benefit from a traditional cisgender pay gap and these years of perceived "maleness" within the workplace. Similarly, FTMs may benefit from transitioning early in life by being perceived as male from the beginning of their careers.

Table 4 presents the estimated income gap between FTMs and MTFs from a series of interval regressions. The first results column re-reports the earlier finding that the income of FTMs is 8% lower than similarly situated MTFs. This full sample of FTMs and MTFs ($n = 10,595$) included those at all stages of transition as well as those who have not transitioned. Results in columns (2)–(5) re-run these regressions, restricting the relevant FTM/MTF samples to those who reported having begun living full-time as their gender identity between the following ages: (2) up to 24; (3) 25–29; (4) 30–34; and (5) 35 or older.

When looking at those who began living full-time at ≤ 24 years old in Column (2), the sign on the income gap estimate is reversed, with MTFs now having 21% higher incomes than FTMs. The income gap coefficient becomes negative again when restricting the sample to those who began living full-time between the ages of 25–29 in Column (3), increasing in magnitude for the sample who transitioned between the ages of 30–34 years in Column (4), and becoming significantly negative again at 14% among those who transitioned at 35 years or older in Column (5).

These results, relating the income of MTFs and FTMs to the age that they transitioned to living "full-time", are robust to alternative definitions of transitioning: (1) the age respondents began hormone therapy;

[35] Over 95% of MTFs and FTMs who were categorised as having 'socially transitioned' previously are also categorised as 'living full-time'.

[36] See C.6 for a table of these results.

Table 4
Interval Income Regression: Age Began Living Full-Time in One's Current Gender Identity.

	(1)	(2)	(3)	(4)	(5)
		Age Began Living Full-Time			
	Full Sample	≤24 yrs old	25–29 yrs old	30–34 yrs old	≥35 yrs old
FTM (ref: MTF)	-0.08*	0.21**	-0.04	-0.14	-0.14*
	(0.04)	(0.08)	(0.06)	(0.09)	(0.08)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	10,595	3688	1464	795	1948

Notes: All estimates in columns (1)-(5) are from interval regression models on log individual income. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

and (2) the age that respondents had their first gender affirming related surgery. Across each specification, the income penalty associated with FTMs, compared with their MTF counterparts, is larger the later FTMs/MTFs transition.[37]

These associations are consistent with the hypothesis that the earlier transgender people complete their transition to living full-time, the more likely they are to display income profiles which are similar to their cisgender male and female counterparts. In short, I find a positive association between income and MTFs who transitioned to female later in life, and FTMs who transitioned to male earlier in life. Conversely, a negative association exists between income and MTFs who transitioned to female earlier, and FTMs who transitioned to male later.

6.2. Alternative transgender identity categorisation

Of the USTS respondents who I categorised as MTFs, approximately 40% choose to identify as women (rather than trans women), and 25% of FTMs identified as men (rather than trans men). These sub-groups of MTFs and FTMs may differ in how long ago they transitioned or in the strength of their gender identity. If these characteristics correlate with economic outcomes, then respondents identifying simply as women/men – without the "trans" modifier – may represent meaningfully different sub-groups of trans people who ought to be distinguished between when estimating outcome gaps.

In Appendix B, I test for these differences and present descriptive statistics comparing MTFs who identify as women with trans women; and FTMs who identify as men compared with trans men (see Table B.8). The two groups of MTFs do not significantly differ along standard demographic or employment characteristics, while FTMs who identify as men have higher rates of education and income compared with their trans male identifying counterparts. The main differences in these groups are along trans specific characteristics. Those simply identifying as women and men are significantly more likely to have socially transitioned to living as their gender identity on a day-to-day basis, and to "pass" as their gender identity rather than their assigned sex. Of those who have socially transitioned, the age at which they began doing so does not significantly differ among these sub-groups of MTFs and FTMs. In Appendix B, I also estimate income, employment, and poverty gaps among these sub-groups of MTFs and FTMs, and find no significant differences between them (see Figure B.6).[38] Overall, any differences among those identifying as men/trans men or women/trans women do not appear to be driving my results.

[37] See C.7 for a table of these results.

[38] With the exception of trans men who are 4 pp more likely to work part-time than men in the FTM group.

7. Further robustness checks

Conroy (2005) argues for the use of ordered logistic regression as a robustness check to interval regression methods to ensure that the substantive conclusions reached are robust to the assumptions used. Compared with interval regression methods which assume normality, ordered logistic income regression methods require less restrictive assumptions, though their results are also less informative. For each income gap estimated using interval regression presented in the main body of this paper, I have fitted an equivalent ordered logistic regression model with ordinal income as the dependent variable (see Appendix D.1, Table D.14–D.16). The significance and direction of association in each of these models are qualitatively similar to those found using interval regression methods.

USTS respondents are young relative to the wider US population. It is likely that older transgender individuals will have had time to develop more stable labour market characteristics. In Appendix D.2, I restrict the sample to respondents who are ≥ 30 years old and re-estimate all of the main outcome gap models presented previously. Each result remains qualitatively similar (see Figure D.9–D.10 and Table D.17–D19).

The USTS was an online survey, conducted using a mixture of non-probability direct outreach, modified venue-based sampling, and snowball sampling methods. In Section 3.1.2, I discussed concerns over the representativeness of the USTS and the degree to which results may be externally valid. If selection bias into the survey is equal across different transgender groups, then selection will not bias outcome gap estimates between transgender groups, but could bias estimates comparing USTS respondents with cisgender people in the ACS. However, if trans groups select into the USTS at different rates, this differential will also lead to bias in the within-transgender comparisons.

To address these concerns, I compared and then weighted the USTS sample to a sample of transgender respondents in the BRFSS which uses population based sampling methods. As a robustness check, I have estimated all of the main models in this paper without survey weights in Appendix D.3. Except for the comparisons with ACS women noted earlier, the significance and direction of association are qualitatively similar across weighted and unweighted model specifications for each outcome (see Figure D.11–D.13 and Table D.20–D.21).

8. Conclusion

This paper is among the first to explore the relationship between transgender identity status, income, employment, and poverty status using the 2015 United States Transgender Survey (USTS). The USTS provides detailed information on respondents' gender identity, assigned sex at birth, and stage of transition, producing a wider range of transgender identities than possible in previous studies. Within the 'Trans' group,

I identify male-to-females (MTFs) and female-to-males (FTMs). Within the genderqueer non-binary ('GQNB') group, I identify those who were assigned male at birth (AMAB GQNBs) and those who were assigned female at birth (AFAB GQNBs).

I use the 2015 American Community Survey (ACS) sample of cisgender individuals as a majority comparison group, against which I estimate outcomes gaps of each minority transgender identity in the USTS. I find descriptive evidence that all minority transgender identity groups have significantly lower incomes and are more likely to be unemployed or working part-time when compared with cis-men from the ACS. These outcome gap estimates are robust to a wide range of regression and decomposition methods and specifications.

When estimating outcomes gaps across the two transgender groups by assigned birth-sex, AMAB GQNBs and AFAB GQNBs have significantly lower incomes and are more likely to be in part-time employment when compared with their MTF and FTM counterparts, respectively. However, when estimating outcome gaps within the 'Trans' group, FTMs have significantly lower incomes, are more likely to be in part-time work, but are less likely to be unemployed compared with MTFs. Within the 'GQNB' group, AFAB GQNBs have significantly lower incomes and are more likely to be in part-time employment, compared with their AMAB GQNB counterparts. In short, transgender people who were assigned female at birth have significantly lower incomes than their assigned male at birth counterparts.

The degree to which respondents have legally, socially, medically and/or surgically transitioned varies substantially within each transgender group. To test the sensitivity of my results to this variation, I compare the incomes of MTFs and FTMs who began living full-time as their gender identity earlier in life, to those who waited until later. I find that the significantly lower incomes associated with FTMs compared with MTFs disappears when restricting the sample to those who began living full-time at a younger age. The incomes of MTFs who begin living full-time as female at a younger age are lower than those who wait, while the incomes of FTMs who begin living full-time as male at a younger age are higher. These findings are consistent with the wider research on the differences in labour market returns experienced by cisgender men and women.

This paper provides a useful early look at the relationship between minority gender identity status and labour market outcomes. The results of this paper demonstrate the importance of accounting for the diversity of minority gender identities within the transgender community when conducting quantitative research on this population. Additional sources of national survey data allowing for transgender respondents to be identified are essential for better understanding this population. Future research should further investigate the determinants behind transgender income and employment outcomes, the degree to which labour market discrimination affects these outcomes, and explore the role public policy might have in improving the overall economic position of transgender people. For example, research is needed to explore the consequences of a recent US Supreme Court ruling which outlawed employment discrimination on the basis of gender identity across the US (Bostock v. Clayton County, 2020).

Appendix A. Additional Information

A1. Glossary[39]

Sex (sex assigned at birth): The designation of a person, typically at or before birth, as either male or female based on their anatomy (genitalia and/or reproductive organs) or biology (chromosomes and/or hormones).

Gender Identity: An individual's internal strongly felt, inherent sense of being male, female or another gender. One's gender identity may or may not correspond to the sex they were assigned at birth or to their secondary sex characteristics. As such, one's gender identity is not necessarily visible to others.

Gender Expression: How an individual manifests, expresses and represents their gender within a specific cultural context. This can be done in numerous ways including through one's behaviour, mannerisms, social interactions, clothing, hairstyles, speech patterns and physical characteristics. Gender expression may or may not conform to a person's gender identity.

Sexual Orientation: Refers to an individual's sexual, romantic and/or emotional attraction to members of the same or different genders. Sexual orientation is distinct from sex, gender identity and gender expression. Transgender people can be heterosexual, homosexual, bisexual among others.

Cisgender: Refers to a person whose gender identity, gender expression and assigned sex at birth are all in alignment; a person who is not transgender. For example, an individual who was assigned female at birth, identifies as female and expresses a female gender identity is a cisgender woman.

Transgender: Refers to a person whose gender identity and/or gender expression differs from the sex assigned to them at birth. It is an umbrella term encompassing all those who are not cisgender and includes transwomen (MTF), transmen (FTM), crossdressers, genderqueer and gender non-conforming individuals.

Trans woman (MTF): A person who was assigned male at birth (AMAB) but who lives as a woman or identifies as female. MTF refers to the direction of transition from male-to-female. MTF is the primary term used in this paper to refer to this group of people.

Trans man (FTM): A person who was assigned female at birth (AFAB) but who lives as a man or identifies as male. FTM refers to the direction of transition from female-to-male. FTM is the primary term used in this paper to refer to this group of people.

Genderqueer: A person whose gender does not align with the gender binary or which varies from the traditional 'norm'. Genderqueer individuals may redefine gender or decline to define themselves as gendered altogether. They may feel both male and female (e.g. bigender or pangender); neither fully male nor fully female (e.g. gender neutral, agender or genderfluid); or a different gender entirely (e.g. third gender).

Gender Non-Binary: An umbrella term for gender identities that fall outside the gender binary of male or female.

Gender Non-Conforming: An umbrella term describing a very broad range of individuals whose gender expression or gender identity is different from societal expectations related to gender or gender roles.

Gender Confirmation Surgery: Also known as gender-affirming surgery or gender/sex reassignment surgery, these terms refer to surgery which changes primary and/or secondary sex characteristics to better align a person's physical appearance with their gender identity. Gender confirmation surgery can be an important part of medically necessary treatment to alleviate gender dysphoria and may include mastectomy, hysterectomy, metoidioplasty, phalloplasty, breast augmentation, orchiectomy, vaginoplasty, facial feminisation surgery, and/or many other procedures.

Transitioning: The process of changing one's gender expression and/or physical appearance in order to more closely reflect one's gender identity.

[39] All definitions and explanations were adapted from the following resources: the American Psychological Association (2015), the National Center for Transgender Equality (2019) FAQs and the Transgender Equality Network Ireland (2019) FAQs.

A2. Descriptive statistics

A2.1. BRFSS and USTS descriptive statistics

Table A.5
Descriptive Statistics by BRFSS and USTS Transgender Sample, Aged 18–65.

	(1)	(2)	(3)	(4)
	BRFSS All Trans	USTS All Trans in BRFSS States	USTS All Trans in all States	USTS All Trans Weighted
Std. Demographics:				
Age	45.2 (14.2)	30.5 (12.1)	30.4 (12.1)	44.6 (15.1)
White	0.65 (0.48)	0.81 (0.39)	0.81 (0.39)	0.69 (0.46)
Black	0.095 (0.29)	0.030 (0.17)	0.029 (0.17)	0.071 (0.26)
Hispanic	0.11 (0.31)	0.053 (0.22)	0.053 (0.22)	0.10 (0.30)
Asian	0.038 (0.19)	0.030 (0.17)	0.026 (0.16)	0.032 (0.18)
Other	0.11 (0.31)	0.075 (0.26)	0.077 (0.27)	0.11 (0.31)
≤ HS Grad	0.50 (0.50)	0.14 (0.35)	0.15 (0.36)	0.46 (0.50)
Some College	0.29 (0.45)	0.46 (0.50)	0.47 (0.50)	0.31 (0.46)
≥ College Degree	0.21 (0.41)	0.40 (0.49)	0.38 (0.49)	0.22 (0.42)
Single, Never Married	0.30 (0.46)	0.40 (0.49)	0.40 (0.49)	0.29 (0.45)
# Adults in Household	2.14 (1.18)	2.34 (1.01)	2.34 (1.01)	2.07 (0.98)
Any Children in Household	0.32 (0.47)	0.15 (0.36)	0.15 (0.35)	0.12 (0.33)
Excellent/V.Good Health	0.41 (0.49)	0.46 (0.50)	0.45 (0.50)	0.44 (0.50)
Heterosexual	0.73 (0.44)	0.11 (0.31)	0.11 (0.32)	0.22 (0.41)
Economic Characteristics				
Employed	0.57 (0.50)	0.68 (0.47)	0.67 (0.47)	0.60 (0.49)
Unemployed	0.085 (0.28)	0.13 (0.33)	0.13 (0.34)	0.10 (0.30)
Out of Labour Force	0.35 (0.48)	0.20 (0.40)	0.20 (0.40)	0.30 (0.46)
HH Income <20K	0.27 (0.45)	0.30 (0.46)	0.31 (0.46)	0.30 (0.46)
HH Income >50K	0.30 (0.46)	0.42 (0.49)	0.41 (0.49)	0.39 (0.49)
No. of Observations	1592	17,210	23,840	23,840

Notes: Means (standard deviations). USTS, United States Transgender Survey; BRFSS, Behavioral Risk Factor Surveillance System. Inverse Probability Weights were applied to the means of column (4).

A2.2. USTS descriptive statistics, unweighted

Table A.6
Descriptive Statistics by Transgender Identity in the USTS, Aged 18–65, Unweighted.

	Trans Group		GQNB Group	
	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
Std. Demographics:				
Age	36.7† (13.8)	28.1 (9.92)	30.0* (11.7)	24.4 (7.21)
White	0.85† (0.36)	0.80 (0.40)	0.81 (0.39)	0.80 (0.40)
≤ HS Grad	0.15† (0.35)	0.17 (0.37)	0.12* (0.33)	0.16 (0.37)
≥ College Degree	0.50† (0.50)	0.46 (0.50)	0.48* (0.50)	0.41 (0.49)
Single, Never Married	0.36† (0.48)	0.41 (0.49)	0.45 (0.50)	0.45 (0.50)
# Adults in Household	2.29† (1.23)	2.48 (1.22)	2.58* (1.37)	2.68 (1.27)
Any Children in Household	0.14 (0.34)	0.15 (0.36)	0.13* (0.34)	0.17 (0.38)
Excellent/V.Good Health	0.50† (0.50)	0.47 (0.50)	0.48* (0.50)	0.37 (0.48)
Supportive Family	0.50† (0.50)	0.57 (0.49)	0.32 (0.47)	0.31 (0.46)
Heterosexual	0.14† (0.34)	0.19 (0.40)	0.071* (0.26)	0.0078 (0.088)
Surgical Transition	0.21† (0.40)	0.38 (0.49)	0.050* (0.22)	0.079 (0.27)
Economic Characteristics				
Employed	0.67 (0.47)	0.69 (0.46)	0.67* (0.47)	0.61 (0.49)
Unemployed	0.13 (0.33)	0.12 (0.33)	0.13* (0.33)	0.15 (0.36)
Out of Labour Force	0.20 (0.40)	0.18 (0.39)	0.20* (0.40)	0.23 (0.42)
Poverty	0.27† (0.44)	0.33 (0.47)	0.33* (0.47)	0.40 (0.49)
Conditional on being in employment				
Avg. Income ('000s $)	48.46† (43.47)	30.58 (31.21)	34.99* (39.01)	21.24 (25.38)
Working Part-Time	0.24† (0.43)	0.39 (0.49)	0.37* (0.48)	0.51 (0.50)
Not Out (at work)	0.26† (0.44)	0.22 (0.42)	0.45 (0.50)	0.45 (0.50)
Outness:				
Not Socially Transitioned:				
Out	0.18† (0.38)	0.10 (0.30)	0 (0)	0 (0)
Not Out	0.19† (0.39)	0.071 (0.26)	0 (0)	0 (0)
Socially Transitioned & Passing:				
Out	0.22† (0.41)	0.41 (0.49)	0 (0)	0 (0)
Not Out	0.052† (0.22)	0.13 (0.33)	0 (0)	0 (0)
Socially Transitioned & Not Passing	0.37† (0.48)	0.30 (0.46)	0 (0)	0 (0)
N	8626	7696	1843	7539
(N | in employment)	5581	5014	1187	4240

Notes: Means (standard deviations). USTS, United States Transgender Survey; MTF, male-to-female (trans women); FTM, female-to-male (trans men); AMAB GQNB, assigned male at birth genderqueer non-binary; AFAB GQNB, assigned female at birth genderqueer non-binary. † indicates that means in column (1) MTFs and column (2) FTMs are significantly different from one another at $p < .01$. * indicates that means in column (3) AMAB GQNBs and column (4) AFAB GQNBs are significantly different from one another at $p < .01$.

A2.3. American community survey

Table A.7
Descriptive Statistics by ACS Gender, Aged 18–65.

	(1)	(2)
	ACS Cis-Men	ACS Cis-Women
Standard Demographics		
Age	42.1 (14.1)	42.8 (14.0)
White	0.69 (0.46)	0.68 (0.47)
Black	0.10 (0.31)	0.11 (0.31)
Hispanic	0.10 (0.30)	0.10 (0.30)
≤ HS Grad	0.41 (0.49)	0.34 (0.47)
Some college	0.23 (0.42)	0.24 (0.43)
Associate's	0.075 (0.26)	0.097 (0.30)
Bachelor's	0.18 (0.38)	0.20 (0.40)
Graduate or Professional	0.10 (0.30)	0.12 (0.32)
Married	0.52 (0.50)	0.54 (0.50)
Never Married	0.35 (0.48)	0.29 (0.45)
Any Children in Household	0.36 (0.48)	0.44 (0.50)
Economic Characteristics		
Employed	0.73 (0.44)	0.66 (0.47)
Unemployed	0.045 (0.21)	0.038 (0.19)
Out of Labour Force	0.22 (0.42)	0.30 (0.46)
Conditional on being in Employment:		
Avg. Income ('000s $)	57.42 (42.01)	41.63 (34.11)
Working Part-Time	0.13 (0.34)	0.27 (0.44)
N	940,738	965,909
(N | in employment)	687,658	634,590

Notes: Mean (standard deviations). ACS, American Community Survey. Sample consists of all those aged 18–65 in the 2015 ACS.

Appendix B. Alternative Transgender Identity Categorisation

Table B.8
Descriptive Statistics. Man/Transman Women/Transwomen.

	Male-to-Female (MTFs)		Female-to-Male (FTMs)	
	(1)	(2)	(3)	(4)
	Trans-Women	Women	Trans-Men	Men
Std. Demographics:				
Age	49.7 (12.5)	50.7 (12.5)	36.3 (14.6)	38.1 (13.8)
White	0.73 (0.44)	0.75 (0.43)	0.60 (0.49)	0.54 (0.50)
≤ HS Grad	0.50 (0.50)	0.46 (0.50)	0.47 (0.50)	0.37* (0.48)
≥ College Degree	0.30 (0.46)	0.34 (0.47)	0.33 (0.47)	0.38 (0.49)
Single, Never Married	0.26 (0.44)	0.23 (0.42)	0.37 (0.48)	0.33 (0.47)
# Adults in Household	2.04 (1.10)	1.95 (1.07)	2.36 (1.23)	2.20 (1.16)
Any Children in Household	0.098 (0.30)	0.095 (0.29)	0.16 (0.37)	0.16 (0.37)
Excellent/V.Good Health	0.46 (0.50)	0.49 (0.50)	0.39 (0.49)	0.46 (0.50)
Supportive Family	0.45 (0.50)	0.50 (0.50)	0.54 (0.50)	0.60 (0.49)
Heterosexual	0.21 (0.41)	0.26 (0.44)	0.25 (0.43)	0.48* (0.50)
Surgical Transition	0.23 (0.42)	0.41* (0.49)	0.39 (0.49)	0.59* (0.49)
Economic Characteristics				
Employed	0.61 (0.49)	0.56 (0.50)	0.61 (0.49)	0.62 (0.49)
Unemployed	0.094 (0.29)	0.090 (0.29)	0.12 (0.33)	0.10 (0.30)
Out of Labour Force	0.30 (0.46)	0.34 (0.47)	0.26 (0.44)	0.28 (0.45)
Poverty	0.26 (0.44)	0.26 (0.44)	0.29 (0.46)	0.26 (0.44)
Conditional on being in employment				
Avg. Income ('000s $)	53.03 (42.53)	55.17 (43.01)	36.17 (33.64)	43.13* (37.35)
Working Part-Time	0.15 (0.35)	0.14 (0.34)	0.32 (0.47)	0.26 (0.44)
Not Out (at work)	0.27 (0.45)	0.19* (0.39)	0.18 (0.38)	0.29* (0.45)
Outness:				
Not Socially Transitioned:				
Out	0.21 (0.41)	0.062* (0.24)	0.13 (0.33)	0.024* (0.15)
Not Out	0.23 (0.42)	0.057* (0.23)	0.069 (0.25)	0.026* (0.16)
Socially Transitioned & Passing:				
Out	0.15 (0.36)	0.38* (0.49)	0.44 (0.50)	0.52* (0.50)
Not Out	0.030 (0.17)	0.11* (0.31)	0.092 (0.29)	0.24* (0.43)
Socially Transitioned & Not Passing	0.38 (0.48)	0.40 (0.49)	0.28 (0.45)	0.18* (0.39)
N	5303	3256	5663	2010
(N | in employment)	3477	2066	3662	1341

Notes: Means (standard deviations). USTS, United States Transgender Survey; MTF, male-to-female (trans-women or women); FTM, female-to-male (trans-men or men). * in column (2) indicates that means in column (2) and column (1) are significantly different from one another at $p < .01$. * in column (4) indicates that means in column (4) and column (3) are significantly different from one another at $p < .01$.

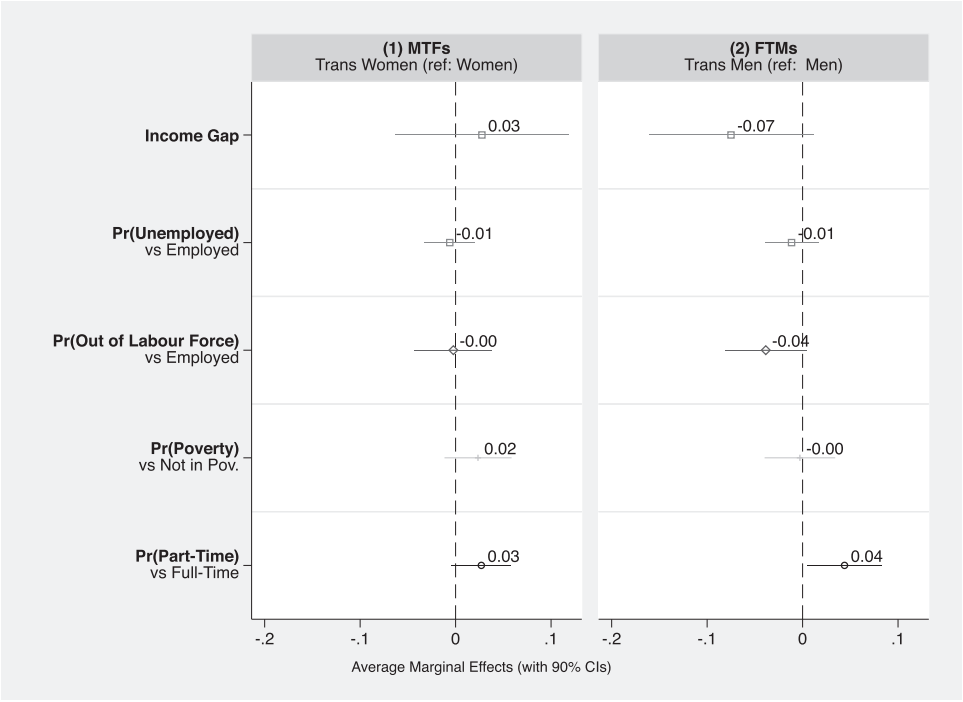

Fig. B.6. Outcome Gaps by Woman/ Transwomen and Man/Transman.

Appendix C. Additional Results

C1. Detailed sexual orientation

Table C.9
Transgender Identity and Individual Income, USTS, Aged 18–65, Detailed Sexual Orientation.

	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
Sexual Orientation (ref: Heterosexual)				
Homosexual	0.13*	0.06	-0.43**	0.59**
	(0.08)	(0.08)	(0.17)	(0.24)
Bisexual	0.07	-0.04	-0.36**	0.31
	(0.08)	(0.07)	(0.18)	(0.25)
Asexual	0.24**	-0.11	-0.30	0.23
	(0.12)	(0.11)	(0.21)	(0.25)
Other	0.04	-0.08	-0.35**	0.36
	(0.08)	(0.06)	(0.14)	(0.24)
Additional Covariates	Yes	Yes	Yes	Yes
F-Stat	1.69	1.54	1.93	4.45
Prob>F	0.15	0.19	0.10	0.00
No. of Observations	5581	5014	1187	4240

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. Sample consists of all those in employment aged 18–65. All models control for age, age-squared, and indicators for race, education, relationship status, state of residence, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

C2. Comparing minority gender identities - Income decomposition results

Table C.10
Decomposition of Transgender Income Gaps.

	(1)	(2)	(3)	(4)
	Trans	GQNB	AMAB	AFAB
1) Ref: Pooled Group				
Explained (prod)	-0.37***	-0.61***	-0.12***	-0.38***
	(0.03)	(0.07)	(0.05)	(0.04)
Advantage	-0.04*	-0.03*	-0.11*	-0.09***
	(0.02)	(0.02)	(0.06)	(0.02)
Disadvantage	-0.02*	-0.06**	-0.01*	-0.04***
	(0.01)	(0.03)	(0.01)	(0.01)
Unexplained (adv+disadv)	-0.05*	-0.09*	-0.12*	-0.13***
	(0.03)	(0.05)	(0.07)	(0.03)
2) Ref: Group A				
Explained (AB)	-0.23***	-0.49***	-0.29***	-0.25**
	(0.05)	(0.08)	(0.06)	(0.11)
Unexplained (AB)	-0.19***	-0.21**	0.04	-0.26**
	(0.06)	(0.10)	(0.09)	(0.11)
3) Ref: Group B				
Explained (BA)	-0.34***	-0.62***	-0.09*	-0.33***
	(0.04)	(0.07)	(0.05)	(0.04)
Unexplained (BA)	-0.08*	-0.08	-0.15**	-0.19***
	(0.04)	(0.06)	(0.07)	(0.04)
Raw Income Gap	-0.42***	-0.70***	-0.24***	-0.52***
	(0.04)	(0.08)	(0.08)	(0.05)

Notes: All estimates in columns (1)-(4) are from interval regression based mean decomposition models on log individual income. The sample consists of all those in employment, aged 18–65. Controls in each model include age, age-squared, and indicators for race, education, relationship status, state of residence, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Bootstrapped standard errors in parentheses (1000 replications). * p<0.10, ** p<0.05, *** p<0.01.

C3. Comparing minority gender identities - Alternative economic margins

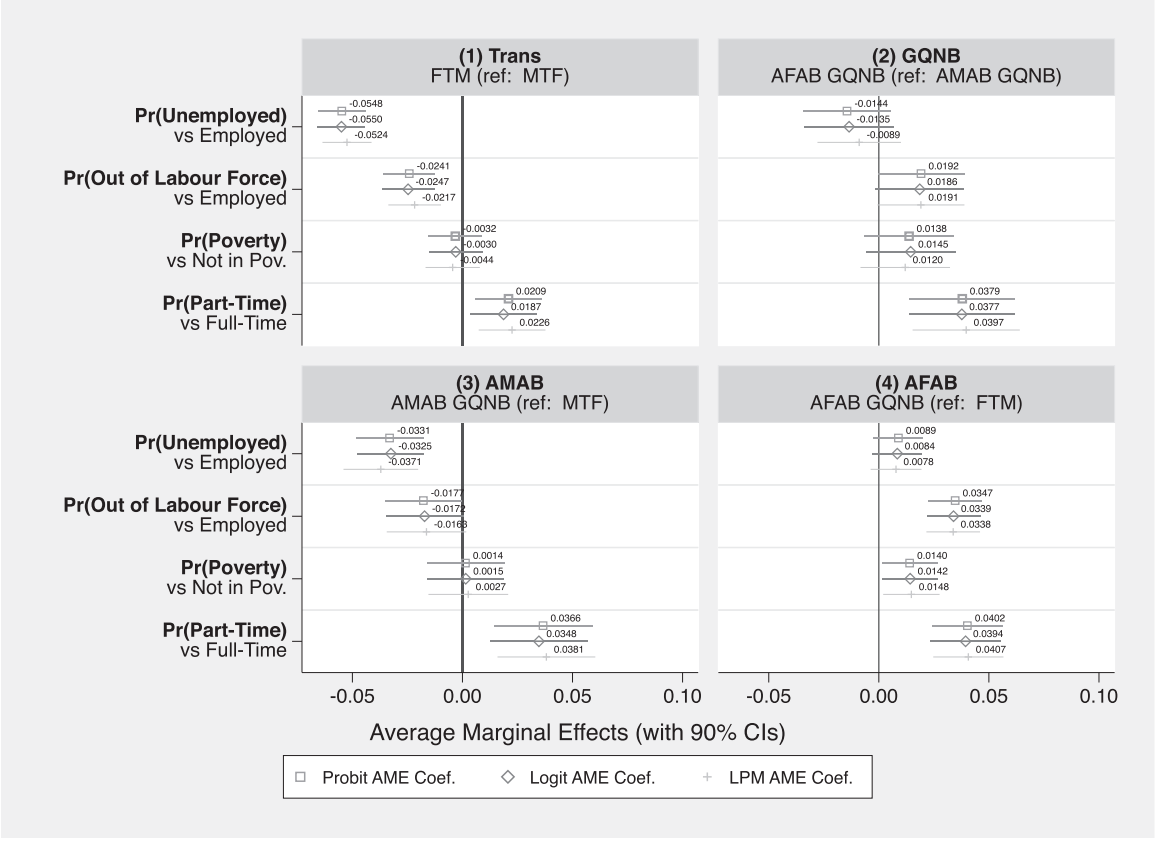

Fig. C.7. Comparing Minority Gender Identities - Alternative Economic Margins (Alternative Model Specifications).

C4. Comparing ACS cisgender and USTS transgender identities - Income regression results

Table C.11
Interval Income Regression: Comparing ACS Cisgender and USTS Transgender Identities.

	(1) MTF	(2) FTM	(3) AMAB GQNB	(4) AFAB GQNB
ACS Cis-Men				
v. MTF	-0.14***			
	(0.03)			
v. FTM		-0.16***		
		(0.03)		
v. AMAB GQNB			-0.18***	
			(0.05)	
v. AFAB GQNB				-0.38***
				(0.03)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	-0.14***	-0.55***	-0.35***	-1.05***
No. of Observations	693,266	692,690	688,852	691,914
ACS Cis-Women				
v. MTF	0.08***			
	(0.03)			
v. FTM		0.01		
		(0.03)		
v. AMAB GQNB			0.02	
			(0.05)	
v. AFAB GQNB				-0.22***
				(0.03)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	0.24***	-0.17***	0.02***	-0.67***
No. of Observations	640,198	639,622	635,784	638,846

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. Sample consists of all those in employment aged 18–65 in the USTS and 2015 ACS. All models control for age, age-squared and indicators for race/ethnicity, education, marital status, part-time worker status, household composition and state of residence. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

C5. Comparing ACS cisgender and USTS transgender identities - Alternative economic margins

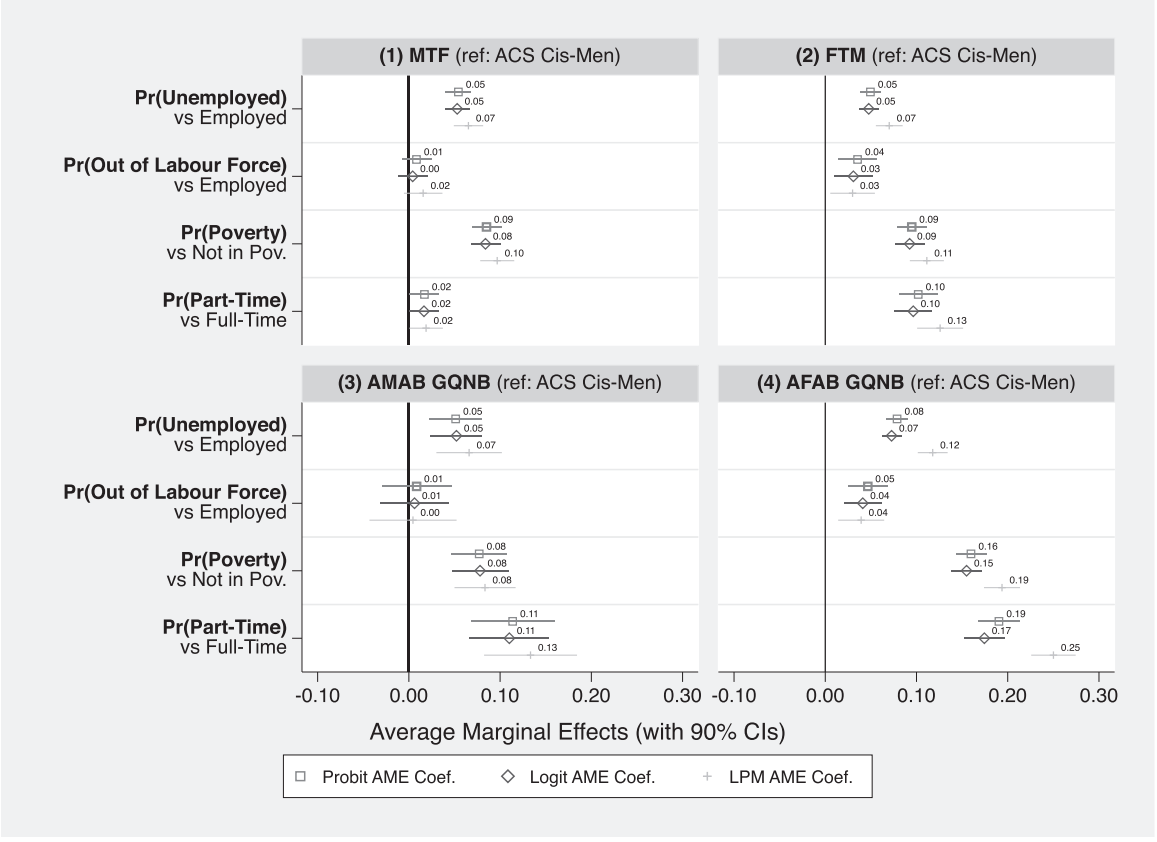

Fig. C.8. Comparing ACS Cis-Men and USTS Transgender Identities - Alternative Economic Margins (Alternative Model Specifications).

C6. Individual interval income regressions - Age began living full-Time

Table C.12
Interval Income Regression: Age Began Living Full-Time in One's Current Gender Identity, by Gender.

	(1)	(2)
	MTF	FTM
Began Living Full-Time (ref: ≤24 yrs)		
25 to 29	0.30***	-0.06
	(0.11)	(0.07)
30 to 34	0.43***	-0.17
	(0.14)	(0.11)
≥ 35 yrs	0.52***	-0.25**
	(0.16)	(0.11)
Additional Covariates	Yes	Yes
No. of Observations	3655	4240

Notes: All estimates in columns (1)-(2) are from interval regression models on log individual income. The sample is restricted to those aged 18–65, in employment, who report living full-time. Additional controls in each model include age, age-squared, and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

C7. Transgender comparisons - Alternative age of transition definitions

Table C.13
Interval Income Regression: Alternative Age of Transition Definitions.

	(1)	(2)	(3)	(4)	(5)
		Age Began Hormone Replacement Therapy			
	Full Sample	≤24 yrs old	25–29 yrs old	30–34 yrs old	≥35 yrs old
FTM (ref: MTF)	-0.08*	0.10	0.03	-0.15*	-0.16*
	(0.04)	(0.08)	(0.06)	(0.08)	(0.08)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	10,595	3131	1621	933	2193
		Age of First Surgical Procedure			
	Full Sample	≤24 yrs old	25–29 yrs old	30–34 yrs old	≥35 yrs old
FTM (ref: MTF)	-0.08*	0.14	0.15	-0.17**	-0.26***
	(0.04)	(0.12)	(0.11)	(0.08)	(0.09)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	10,595	1500	1254	779	1997

Notes: All estimates in columns (1)-(5) are from interval regression models on log individual income. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Appendix D. Robustness Checks

D1. Core results - Estimated using ordered logistic income regression models

Table D.14
Ordered Logistic Income Regression: Comparing Minority Gender Identities.

	(1)	(2)	(3)	(4)
	Trans	GQNB	AMAB	AFAB
FTM (ref: MTF)	-0.19**			
	(0.09)			
AFAB GQNB (ref: AMAB GQNB)		-0.23†		
		(0.14)		
AMAB GQNB (ref: MTF)			-0.26*	
			(0.15)	
AFAB GQNB (ref: FTM)				-0.23***
				(0.09)
Additional Covariates	Yes	Yes	Yes	Yes
No. of Observations	10,595	5427	6768	9254

Notes: All estimates in columns (1)-(4) are from ordered logistic (income) regression models. The sample consists of all those in employment aged 18–65. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. † p<0.103, * p<0.10, ** p<0.05, *** p<0.01.

Table D.15
Ordered Logistic Income Regression: Comparing ACS Cisgender and USTS Transgender Identities.

	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
ACS Cis-Men				
v. MTF	-0.28***			
	(0.07)			
v. FTM		-0.45***		
		(0.07)		
v. AMAB GQNB			-0.51***	
			(0.13)	
v. AFAB GQNB				-0.91***
				(0.07)
Additional Covariates	Yes	Yes	Yes	Yes
No. of Observations	693,266	692,690	688,852	691,914

Notes: All estimates in columns (1)-(4) are from ordered logistic (income) regression models. Sample consists of all those in employment, aged 18–65, in the USTS and 2015 ACS. All models control for age, age-squared and indicators for race/ethnicity, education, marital status, full-time worker status, household composition and state residence. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table D.16
Ordered Logistic Income Regression: Age Began Living Full-Time.

	(1)	(2)	(3)	(4)	(5)
		Age Began Living Full-Time			
	Full Sample	≤24 yrs old	25–29 yrs old	30–34 yrs old	≥35 yrs old
FTM (ref: MTF)	-0.19**	0.48***	-0.03	-0.50*	-0.40*
	(0.09)	(0.18)	(0.18)	(0.26)	(0.21)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	10,595	3688	1464	795	1948

Notes: All estimates in columns (1)-(5) are from ordered logistic (income) regression models. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

D2. Core results - Estimated using sample aged 30–65 years old

Table D.17
Interval Income Regression: Comparing ACS Cisgender and USTS Transgender Identities, Aged 30–65.

	(1)	(2)	(3)	(4)
	MTF	FTM	AMAB GQNB	AFAB GQNB
ACS Cis-Men				
v. MTF	-0.13***			
	(0.03)			
v. FTM		-0.16***		
		(0.04)		
v. AMAB GQNB			-0.14**	
			(0.06)	
v. AFAB GQNB				-0.33***
				(0.05)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	-0.26***	-0.38***	-0.28***	-0.53***
No. of Observations	543,143	541,449	540,041	540,496
ACS Cis-Women				
v. MTF	0.09***			
	(0.03)			
v. FTM		0.02		
		(0.04)		
v. AMAB GQNB			0.08	
			(0.07)	
v. AFAB GQNB				-0.15***
				(0.04)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	0.15***	0.03	0.13*	-0.12*
No. of Observations	497,088	495,394	493,986	494,441

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. Sample consists of all those in employment aged 30–65 in the USTS and 2015 ACS. All models control for age, age-squared and indicators for race/ethnicity, education, marital status, part-time worker status, household composition and state of residence. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table D.18
Interval Income Regression: Comparing Minority Gender Identities, Aged 30–65.

	(1)	(2)	(3)	(4)
	Trans	GQNB	AMAB	AFAB
FTM (ref: MTF)	-0.10*			
	(0.05)			
AFAB GQNB (ref: AMAB GQNB)		-0.18**		
		(0.08)		
AMAB GQNB (ref: MTF)			-0.14*	
			(0.08)	
AFAB GQNB (ref: FTM)				-0.11*
				(0.06)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	-0.12***	-0.27***	-0.02	-0.16***
No. of Observations	5519	1483	4117	2885

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. The sample consists of all those in employment aged 30–65. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table D.19
Interval Income Regression: Age Began Living Full-Time (Sample Aged 30–65).

	(1)	(2)	(3)	(4)	(5)
		Age Began Living Full-Time			
	Full Sample	≤24 yrs old	25–29 yrs old	30–34 yrs old	≥35 yrs old
FTM (ref: MTF)	-0.10*	0.25*	-0.16**	-0.14	-0.14*
	(0.05)	(0.15)	(0.08)	(0.09)	(0.08)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	5519	701	737	795	1948

Notes: All estimates in columns (1)-(5) are from interval regression models on log individual income and a sample aged 30–65. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

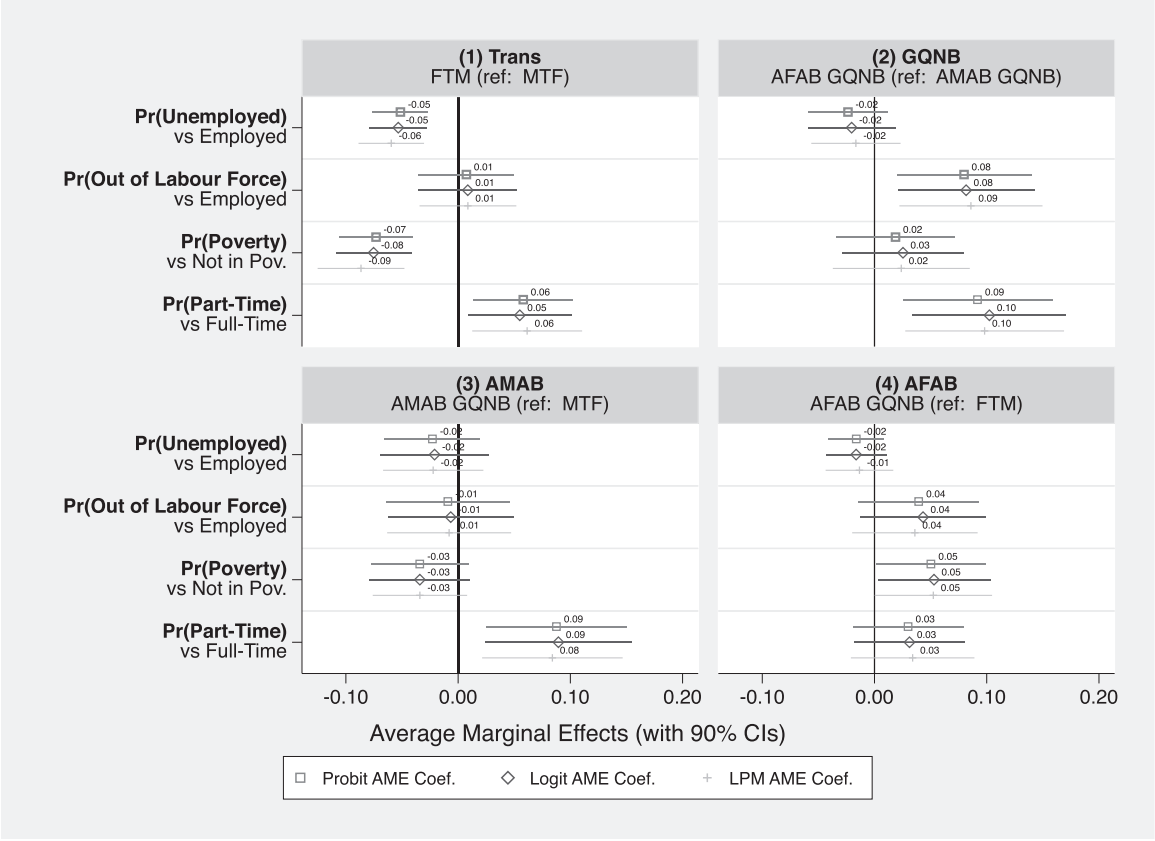

Fig. D.9. Comparing Minority Gender Identities - Alternative Economic Margins (Sample Aged 30–65).

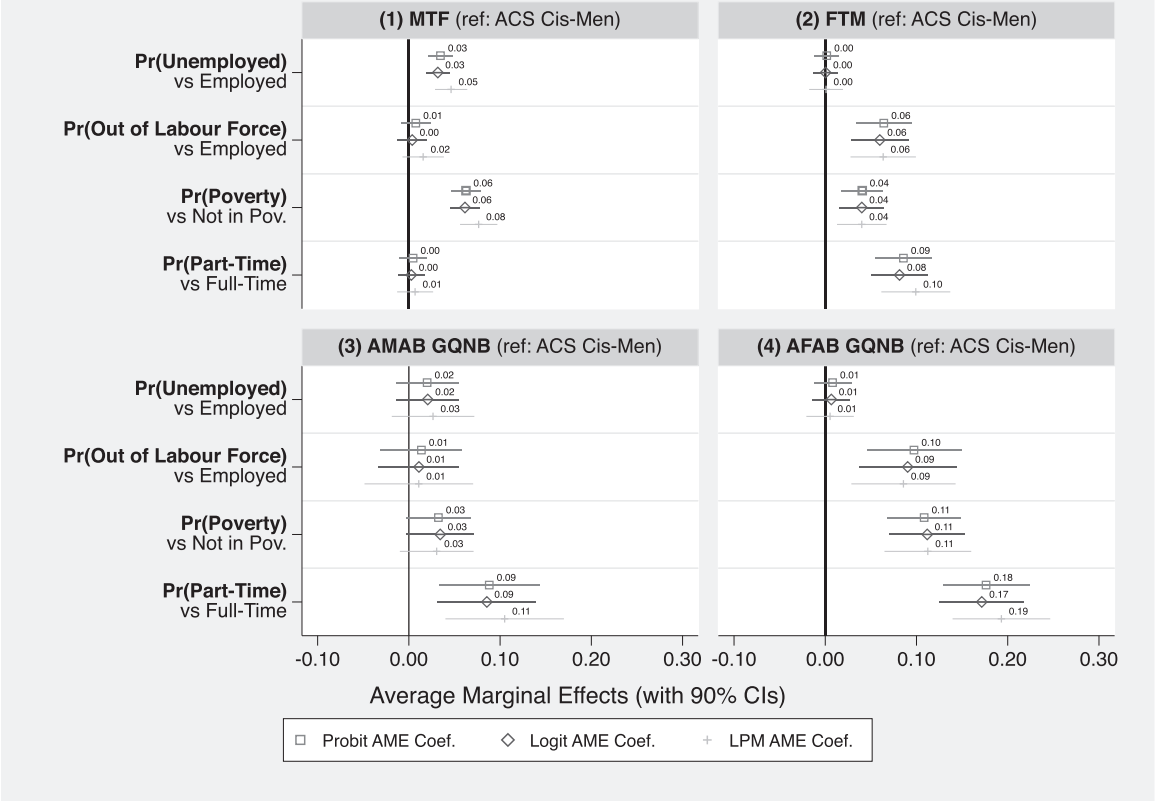

Fig. D.10. Comparing ACS Cisgender and USTS Transgender Identities - Alternative Economic Margins (Sample Aged 30–65).

D3. Core results - Estimated without survey weights

Table D.20
Interval Income Regression: Comparing Minority Gender Identities.

	(1)	(2)	(3)	(4)
	Trans	GQNB	AMAB	AFAB
FTM (ref: MTF)	-0.13***			
	(0.02)			
AFAB GQNB (ref: AMAB GQNB)		-0.14***		
		(0.03)		
AMAB GQNB (ref: MTF)			-0.14***	
			(0.03)	
AFAB GQNB (ref: FTM)				-0.16***
				(0.02)
Additional Covariates	Yes	Yes	Yes	Yes
Raw Income Gap	-0.50***	-0.50***	-0.48***	-0.47***
No. of Observations	10,595	5427	6768	9254

Notes: All estimates in columns (1)-(4) are from interval regression models on log individual income. The sample consists of all those in employment aged 18–65. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

Table D.21
Interval Income Regression: Age Began Living Full-Time.

	(1)	(2)	(3)	(4)	(5)
		Age Began Living Full-Time			
	Full Sample	**≤24 yrs old**	**25–29 yrs old**	**30–34 yrs old**	**≥35 yrs old**
FTM (ref: MTF)	-0.13***	0.00	-0.07	-0.16**	-0.30***
	(0.02)	(0.03)	(0.04)	(0.07)	(0.05)
Additional Covariates	Yes	Yes	Yes	Yes	Yes
No. of Observations	10,595	3688	1464	795	1948

Notes: All estimates in columns (1)-(5) are from interval regression models on log individual income. Additional controls in each model include age, age-squared and indicators for race, education, relationship status, state of residence, sexual orientation, part-time work, the number of adults in each household, an indicator for children in the household, good health, supportive family, and disclosure of gender identity at work. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<0.01.

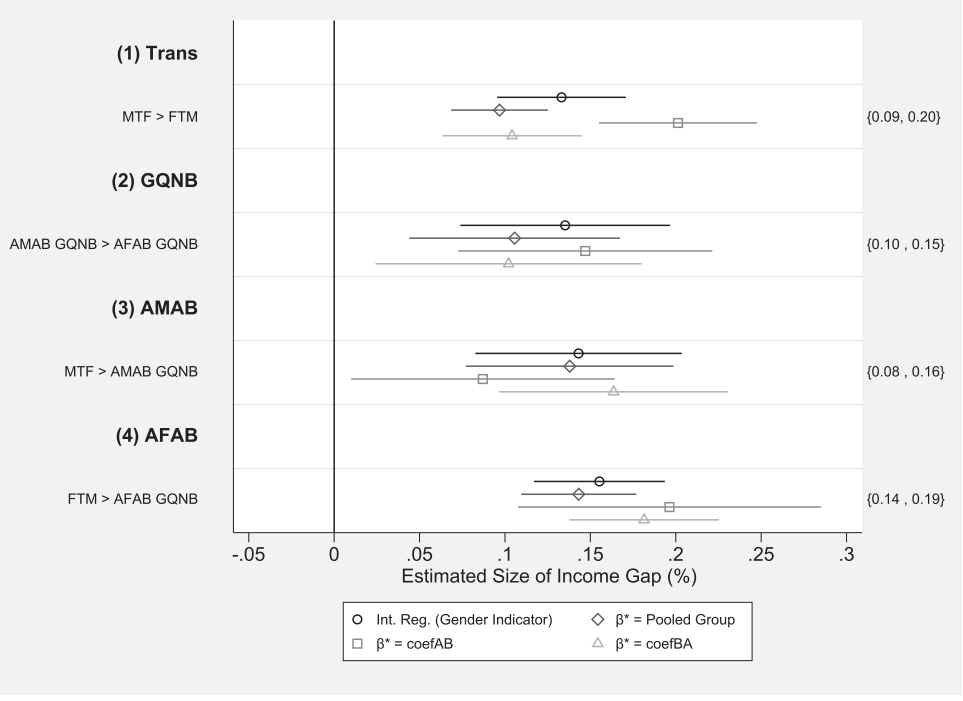

Fig. D.11. Decomposition Analysis: Estimates of the Unexplained Portion of the Income Gap between Minority Gender Identities.

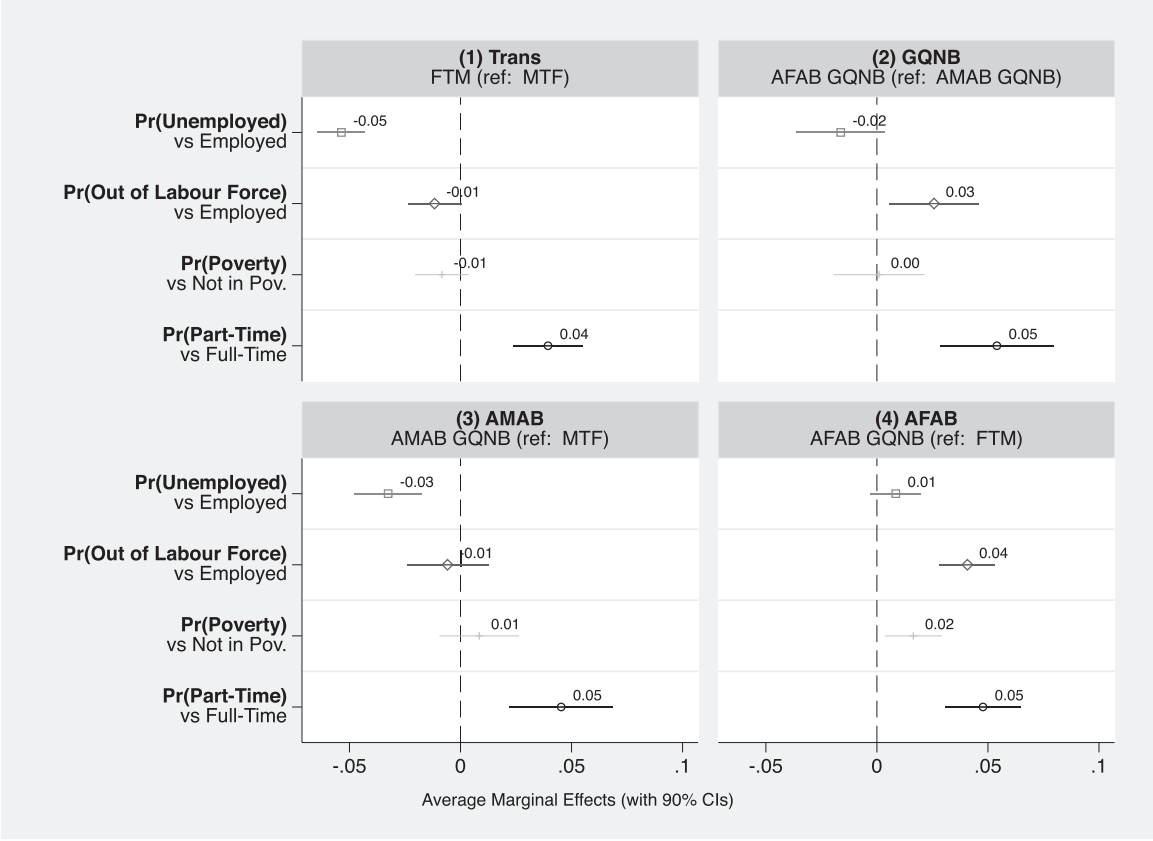

Fig. D.12. Comparing Minority Gender Identities - Alternative Economic Margins.

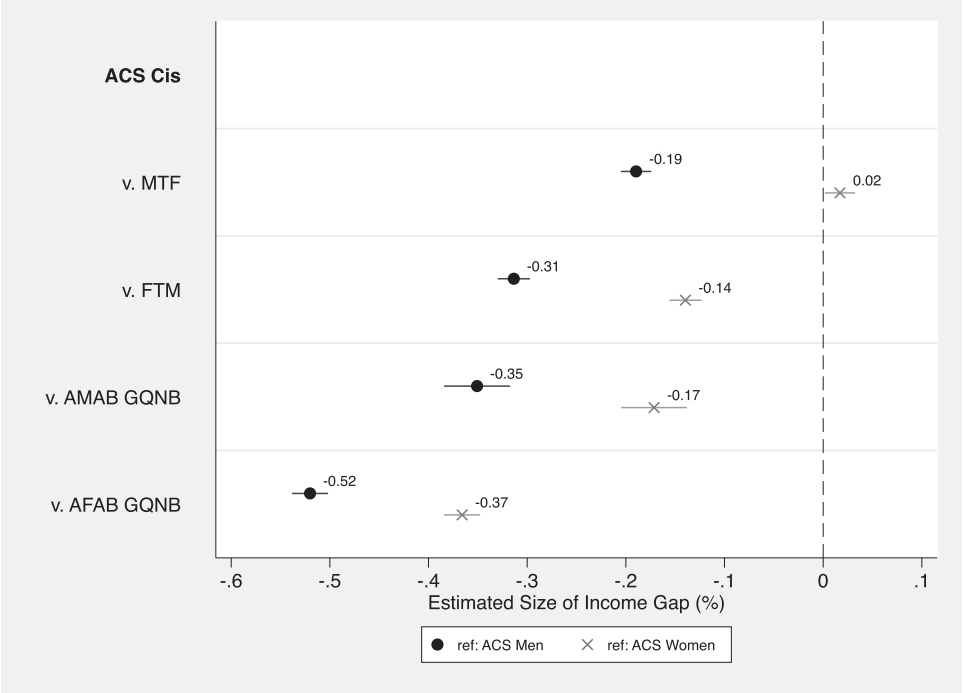

Fig. D.13. Interval Income Regression Estimates Comparing ACS Cisgender and USTS Transgender Identities.

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