Summary of JDE replication results [see JDE replication tables and memo for further details]

	Table 1a. Characteristics in full matched samples and population, 1865	Table 1b. Characteristics of internal and international migrants in matched sample and population, 1900	Table 2. Household assets and migration, marginal effects from Probit estimation
Main result(s):	Men in matched sample are more likely to be from urban area, samples very similar on all other characteristics	Main characteristic with large difference between matched sample & population is urban status in 1900	Parental wealth and strong ties to local area reduce the probability of migration
Replications using original data sample			
ABE-NYSIIS: unique by exact age	Less likely to live in parent's birthplace	✓	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓	✓
ABE-NYSIIS: unique within 5-year band	Less likely to live in parent's birthplace and have assets	✓	✓
Replications using full-count census data			
ABE-NYSIIS: unique by exact age	Less likely to live in parent's birthplace	✓	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓	✓
ABE-NYSIIS: unique within 5-year band	Less likely to live in parent's birthplace and have assets	✓	✓
ABE-Exact: unique within 5-year band	Less likely to live in parent's birthplace and have assets	✓	✓
ABE-Exact: unique within 5-year band, exact age matches	Less likely to live in parent's birthplace and have assets	✓	✓
ABE-JW: unique by exact age	Less likely to live in parent's birthplace and have assets	✓	✓
ABE-JW: within 5-year band	Less likely to live in parent's birthplace and have assets	✓	✓
EM: $p = 0.90; l = 0.75$	Less likely to live in parent's birthplace and have assets	✓	✓
EM $p = 0.80; l = 0.75$	Less likely to live in parent's birthplace and have assets	✓	✓

	Table 3. Household assets and migration, using alternative measure of household assets	Table 4. Expected inheritance and migration	Figures 1 & 2. Brothers, sisters and regional differences in migration	Table 5. Expected inheritance and asset-holding adulthood
Main result(s):	Men from wealthier families less likely to migrate	Oldest sons from wealthier families are less likely to migrate. Effect is stronger in North/West (primogeniture system)	Additional brothers increase probability to migrate in families with assets in the East. Effect is increasing in the number of brothers	Oldest sons from wealthier families in the North/West are more likely to have assets in 1900. No relationship in the East
Replications using original data sample				
ABE-NYSIIS: unique by exact age	✓	✓✓	✓✓	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓✓	✓✓	✓
ABE-NYSIIS: unique within 5-year band	✓	✓, Stronger effect in East	✓, No increasing effect of brothers in the East	✓
Replications using full-count census data				
ABE-NYSIIS: unique by exact age	✓	✓✓	✓, No increasing effect of brothers in the East	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓✓	✓✓	Slightly more likely to have assets in East
ABE-NYSIIS: unique within 5-year band	✓	✓✓	No clear positive relationship	✓
ABE-Exact: unique within 5-year band	✓	✓, Stronger effect in East	Negative effect	✓
ABE-Exact: unique within 5-year band, exact age matches	✓	✓, Small positive effect in North/West	Negative effect	✓
ABE-JW: unique by exact age	✓	✓✓	✓✓	✓
ABE-JW: within 5-year band	✓	✓, Stronger effect in East	✓✓	✓
EM: p = 0.80; l = 0.75	✓	✓, Small positive effect in North/West	No clear positive relationship	✓
EM p = 0.90; l = 0.75	✓	✓, Stronger effect in East	No clear positive relationship	✓

	Figures 3 & 4. Brothers, sisters and regional differences in assets holding	Table 6. Parental assets, expected inheritance and destination choice.		
Main result(s):	For men from the East, among families with assets, having sisters increases the probability of having assets in adulthood, while having brothers lowers it (consistent with equitable sharing among brothers)	Men from families with assets less likely to be internal and international migrants. Effect is negative and stronger for moving to US	For men from households with assets, additional brothers predict international rather than internal migration	Urban residence is more associated with long-distance migration (overseas and within Norway)
Replications using original data sample				
ABE-NYSIIS: unique by exact age	No clear relationship between sisters and having assets in adulthood	✓✓	✓	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓✓	✓	✓
ABE-NYSIIS: unique within 5-year band	Negative effect of having sisters, no clear effect for brothers	✓✓	✓	✓
Replications using full-count census data				
ABE-NYSIIS: unique by exact age	✓	✓✓	Slightly stronger effect on within-province migration	✓
ABE-NYSIIS: unique by exact age, Norwegians matched on province	✓	✓, stronger effect for moving within provinces	✓	✓
ABE-NYSIIS: unique within 5-year band	No clear relationship between sisters and having assets in adulthood	✓✓	✓	✓
ABE-Exact: unique within 5-year band	No clear relationship between sisters and having assets in adulthood, positive effect on brothers	✓✓	✓	✓
ABE-Exact: unique within 5-year band, exact age matches	Positive effect on brothers	More likely to move within provinces, ✓	Brothers do not predict international migration	✓
ABE-JW: unique by exact age	✓	✓, stronger effect for moving within and between provinces	✓	✓
ABE-JW: within 5-year band	✓	More likely to move within provinces, ✓	✓	✓
EM: p = 0.80; l = 0.75	No clear relationship between brothers and having assets in adulthood	✓, stronger effect for moving within and between provinces	✓	✓
EM: p = 0.90; l = 0.75	✓	More likely to move within and between provinces, ✓	Brothers do not predict international migration	✓

Memo on JDE replication results

Summary

In our JDE paper we used the complete digitized Norwegian censuses of 1865 and 1900, and a dataset of all Norwegian-born men residing in the US in 1900 derived from Ancestry.com. We linked these datasets using the standard ABE iterative matching procedure, using first name, last name, age, and province of birth (for men who remained in Norway). Since our original study, there have been two main developments in historical record linkage. First, the full-count census data became available through the NBER. Second, a number of "second generation" matching algorithms have been developed. We first replicate the results of the original analysis using the newly-available full-count 1900 US census data with the original (ABE) matching algorithm. We then present results using "second-generation" matching algorithms such as the ABE algorithm with Jaro-Winkler adjustment (JW) and EM matching algorithms, and examine variations of the ABE algorithm that require an exact match on names and ages.

Here is a summary of how our key results replicate: We find that our main finding that people from wealthier backgrounds are less likely to migrate in this era holds across all matching algorithms (tables 2 and 3). Our findings that wealth affected migration mainly through its effect on opportunities in the source country is supported by most methods, but there are also some mixed results (tables 4 and 5, and figures 1-4). The remainder of this document explains the replication steps and discusses in detail all replication results.

Replication steps and results

The specific matching methods we use in all our replications are outlined in detail here.

We report the key results from our replication exercises here:
- Table 1a and 1b in the original paper summarize the differences between the population and the matched sample for all individuals, as well as for internal and international migrants. We originally found that the only important difference between our matched sample and the population was on 1865 urban status. In our replications, we also find that people in our matched sample are less likely to live in their parent's birthplace and to have assets.
- We originally found that parental wealth and strong ties to local area reduce the probability of migration (Table 2). This finding is robust to all linking methods.
- Table 3 of the original paper showed that the results in table 2 are robust to many alternative measures of household wealth. Again, this finding is robust to all linking methods.
- In Table 4, we found that the oldest sons in families with assets were less likely to migrate because of their expected inheritance. Moreover, we found that this effect is especially strong in the North/West because the culture of primogeniture was more strongly maintained. While our first finding replicates well across all linking methods, the stronger effect in the North/West is lost in the most conservative methods. In a few cases, the effect in the North/West is positive and very small.
- In Figures 1 and 2, we showed that the effect on the number of brothers was consistent with a story in which migration was affected by the availability of opportunities in the home country and that they depended on the existence of a primogeniture system in the North/West and more equitable distribution in the East. In particular, we showed that the effect of an additional brother in the East in households with assets was positive and increasing, while the difference between households with and without assets was absent in the North/West. We find more mixed evidence on this relationship. While many methods show a positive relationship, some others do not show a positive trend on the

effect of brothers. Moreover, the most conservative methods do not find a consistently positive relationship for the number of brothers and some of them even show a negative one.

- Table 5 and Figures 3 and 4 explored further the relationship between birth order, gender, and expected inheritance. In particular, this table lends support to the idea that these characteristics affected the probability of receiving a bequest, and therefore greater opportunities in the home country and a lower probability of migration. In particular, Table 5 showed that the oldest son is more likely to have assets in 1900, but only in the North/West. This finding is shown to be very robust to almost all methods.

- Figures 3 and 4, explored the regional differences on the effect of the number of sisters and brothers on having assets in adulthood. In particular, these tables showed that having sisters consistently increases the probability of having assets in the East, while the opposite is true for brothers. Meanwhile, there is no clear pattern in the North/West. We get more mixed evidence across linking methods. While in half of the cases the finding replicates well, especially when using the full-count census data, in some cases we get that there is not a clear relationship between sisters (respectively, brothers) on having more (less) assets in the East. In a few cases, when we use ABE-exact matches, we find a positive effect for the having brothers in the East.

- Finally, in Table 6 we explored the determinants of migration and destination choice using a multinomial logit model. We highlighted three main findings: men from families with assets are less likely to be internal and, especially, international migrants; for men from households with assets, additional brothers predict international rather than internal migration; and urban residence is more associated with long-distance migration (overseas and within Norway). These findings are consistent with a story in which wealth deters migration and the ones who have to migrate (those that face increasing competition for family resources) migrate to places with larger returns (instead of costly migration being the main driver of location choice). We still find that having assets decreases migration abroad across all the linking methods, though in a few cases assets can be positively related to move within a province. Moreover, though the effect of moving to the US is always negative and strong, in a few cases we find stronger effects for internal migration.

- The second finding, that more brothers in wealthier families predict international migration and that this effect is stronger than the one for internal migration shows to be very robust except for two cases in which we do not find an effect and one in which within province migration seems to be more important. Finally, the effect of urban residence is robust across all methods.