Did Children's Education Matter? Family Migration as a Mechanism of Human Capital Investment. Evidence From Nineteenth Century Bohemia

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# Did Children's Education Matter? Family Migration as a Mechanism of Human Capital Investment. Evidence From Nineteenth Century Bohemia

**Alexander Klein**

Department of Economics, University of Warwick, Coventry CV4 7AL, United Kingdom

a.klein.1@warwick.ac.uk[1]

**Abstract**

This paper analyzes the rural-urban migration of families in the Bohemian region of Pilsen in 1900. Using a new 1300-family dataset from the 1900 population census I examine the role of children's education in rural-urban migration. I find that families migrated to the city such that the educational attainment of their children would be maximized and that there is a positive correlation between family migration and children being apprentices in urban areas. The results suggest that rural-urban migration was powered not only by the exploitation of rural-urban wage gaps but also by aspirations to engage in human capital investment.

**Keywords**: migration, human capital investment, family decision-making

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## I

Economic incentives are unquestionably important in rural-urban migration decisions. The prospect of higher wages in cities is so attractive that it spurs an outflow of the rural population toward urban areas[2]. Cities, however, provide more than higher wages. Cities also provide education. Migration to a city thus allows taking advantage of the rural-urban wage gap *as well as* educational opportunities. This raises the question: do migrants move to cities only to gain the wage benefit or do they move to invest into human capital too? This paper tries to answer this question by analyzing rural-urban migration by entire families. The results show that the age composition of migrant children on the arrival to Pilsen is such that their educational attainment was maximized and that there is a positive correlation between family migration and children being apprentices in urban areas. This suggests that families moved to a city not only to take advantage of the real urban wage premium but *also* to invest into children's human capital. The analysis stems from an economic theory, empirically it uses a regression framework and a unique dataset of nearly 1300 families derived from the Habsburg monarchy population census. The economy chosen for micro-level analysis is the Pilsen region of Bohemia (the Czech Lands) around 1900.

Family migration offers a genuine opportunity to investigate whether one of the migration motives is investment into human capital in cities. Parents, by moving to a town, influence their own well-being as well as the well-being of their children. Children can achieve not only higher living standards due to employment in industrial sector or parents' higher wages, but also a better education, which then enables them to achieve upward economic mobility and escape their parents' occupational trajectory. Therefore, if we observe that the pattern of family migration is such that families migrate so that children can benefit from better urban educational facilities, we can be fairly confident that rural-urban migration involved human capital investment.

[2] See for example Boyer,' Labour Migration'; Boyer et al., 'Migration and Labour'; Grant, Migration and Inequality; Long, 'Rural-Urban Migration'; Silvestre, 'Internal Migration'.

Current research on historical migration focuses on various issues related to the determinants of migration as well as the effects of migration on the growing urban sector.[3] Studies showed that migrants responded to economic incentives and that positive real wage gap between receiving and sending regions was an important factor of migration. Some of the studies suggested that migration to urban areas might be also driven by the prospect of intergenerational mobility. Recently Jason Long has shown that the prospect of upward intergenerational occupational mobility in urban areas was indeed a strong motive for people to leave rural lands.[4] This paper is a contribution to this line of migration research. Since educational attainment is very likely to be an important factor for occupational mobility, analyzing the relationship between the prospect of education in a town and migration may shed more light on association between the prospect of occupational mobility and the migration decision-making.

This paper also contributes to the economic history literature on late developing economies as a micro-based study of migration in nineteenth-century Bohemia, one of the fastest-growing and most successful late industrializing economies in nineteenth-century Europe. It also expands the existing economic history literature on Bohemia (for example Cerman and Zeitlhofer, *Sozial Strukturen*, Ehmer and Zeitlhofer, *Ländliche Migration*, Laník, 'Urbanization and industrialization', Ogilvie,'The economic world', Ogilvie, 'Communities and the 'second serfdom' ', Ogilvie and Edwards, 'Women and the 'second serfdom' ').

The paper proceeds as follows. The second section presents the theoretical basis for the analysis. The third section describes the economy of the Pilsen region around 1900. The fourth section discusses education sector in the Pilsen region. The fifth section presents the unique dataset collected for the analysis. The sixth section includes the regression analysis with the discussion and the implications of the results. The last section presents the conclusions.

[3] See for example Baines, Migration in a Mature; Boyer,' Labour Migration'; Boyer et al., 'Migration and Labour'; Grant, Migration and Inequality; Galenson et al., 'Economic and Geographic'; Silvestre, 'Internal Migration'; Steckel, 'Household Migration'; Williamson, *Copying with City*.

[4] Long, 'Rural-Urban Migration'.

## II

Economic theory provides a model of migration decision-making in which the utility of both parents and children are taken into account.[5] The goal of a family is to maximize its utility which depends on the consumption of parents, children, and the number of children. It is assumed that parents are altruistic toward their children. The family decides whether to migrate to urban areas or not by comparing the expected family utility of living in urban areas with the expected family utility of living in rural areas. The family migrates if it derives a higher expected family utility from urban than rural areas after adjusting for the costs of migration.[6]

What are the implications of this logic for investigating family rural-urban migration? Apart from the obvious considerations of the differences between expected real rural and urban income of parents, children's expected rural and urban income now becomes crucial in the migration decision too. This implies that child labor and children's education become factors in family migration. Child labor is a factor because migration to a town would increase the expected income of children since they can work in the industrial sector, which usually pays higher wages than the agricultural sector. Children's education becomes a factor because it influences children's income when they are adults. The idea is that urban areas provide higher quality education and more secondary educational opportunities than rural areas. As a consequence migration to a town offers children the benefit of better education and thus higher expected future income. There are two supporting arguments of urban areas having a more attractive educational sector than rural areas. First relates to the higher quality of primary education. Rural primary schools were usually underfinanced and had a higher pupil-teacher ratio than urban schools, often operating as a "one-room schoolhouse", where there is one teacher for all pupils irrespective of grade. All this means that teachers had too many pupils and too few resources to provide a high quality of teaching. The second argument concerns secondary education. High schools, technical schools and vocational schools were more likely to be located in

[5] See Becker and Barro, 'A Reformulation'.

[6] A formal model is provided in the Appendix.

urban than in rural areas and therefore, urban areas provided more opportunities to acquire higher education than rural areas.

There is one caveat that needs to be addressed. One might question the importance of primary education. Unfortunately, there is no literature on the returns to primary education in either Bohemia or Austria-Hungary in the nineteenth century, so we can not assess this problem yet. The best we can do at the moment is to use the existing research on other countries. The only relevant study on the returns to primary education is on Victorian Great Britain that shows that primary education did play a significant role in children's future occupations, though the magnitude of the effect is small relative to modern times.[7] Although these results certainly can not substitute for studies on Bohemia, they suggest that in this period primary education played an important role in children's futures and that it should not be dismissed from the analysis.

What kind of data would be needed and what empirical strategy should we use to investigate the above reasoning? Ideally, we would have data on the factors influencing migrant family decision-making. Unfortunately, historical data of this kind are very difficult to obtain. It turns out, however, that in our case the Habsburg monarchy population census with its unique information on the time of arrival to the place of residence makes it possible to infer whether the education of children was a migration factor. The idea is that it is beneficial for children to spend as much time in schools as possible since it maximizes their educational attainment, which then positively influences their future income. Since it is argued that urban areas provide a higher quality of education, children would be better off attending urban rather than rural schools for as long as possible. Therefore, the timing of migration should be such that the number of years spent in high quality urban schools is maximized. Empirically, the migration decision is then analyzed using a probit regression with a dependent variable indicating whether a family migrates or stays in the hinterlands, and explanatory variables indicating the presence of offspring in the age group when children usually start education and various controls. The 1900 Habsburg population census provides all the necessary information. In addition to standard demographic information such as date of birth and gender, it contains family kinship,

[7] Long, 'The Socioeconomic Returns'.

occupation and the year of arrival to the urban center. This means that we can reconstruct which families came to Pilsen in 1900, and the age and sex of the children in these families.

To supplement the above regression results, I also provide evidence on the correlation between the occupation of children on arrival to Pilsen and family migration. Empirically we would proceed as in the previous case and use probit regression with a dependent variable indicating whether a family migrates or stays in the hinterlands, and explanatory variables consisting of the occupation of children and various controls.

## III

Pilsen is located in southwest Bohemia, part of the modern Czech Republic. Until 1918, it belonged to the Austrian part of the Habsburg monarchy. Throughout the first half of the nineteenth century, although known for its mining and food industries, Pilsen did not play an important role in the Bohemian economy. This began to change in the 1860s, as railways were built between 1863 and 1872 and new coal deposits were uncovered in the late 1860s. Railways connected Pilsen with Prague, southern and western Bohemia, lower Austria, and southern Germany. Coal had positive forward linkages to industries like steel, iron and machine-building. The beer industry also started to flourish and became the most important branch of the food industry. Pilsen soon became a rapidly growing town with food, iron, steel, and machine-building industries, and by the 1870s it was the second most important industrial and commercial center in Bohemia, after Prague. After a brief crisis in the 1870s, Pilsen's industrialization accelerated. By the end of the nineteenth century, 51 percent of its population was working in industry and 25 percent in services and Pilsen had become one of the most developed cities not only in Bohemia but also in the whole Habsburg monarchy (Chylík, 'Hospodářský rozvoj Plzně', Daneš, 'Obyvatelstvo království', Janáček, *Největší zbrojovka*). The industrialization of Pilsen took the form of flexible specialization rather than mass production.[8]

[8] This is suggested by the sheer range of various products produced in Pilsen and the fact that even the largest firm in Pilsen, Škoda, did not have mass production. See for example Janáček, *Největší zbrojovka*, and Jíša, *Škodovy závody*.

The region around the city of Pilsen included a mixture of farms and small and medium firms working in the mining, metal, and food industry.[9] Firms provided employment and apprenticeship opportunities, although only to a limited extent—the industrial sector accounted only for about twenty percent of total employment. In agricultural sector, people worked either on their own plots of lands or/and on large farms. The farms provided employment opportunities for skilled as well as unskilled workers. Unskilled workers were often used for difficult manual tasks during harvest while skilled labor was employed to manage agricultural production and monitor unskilled workers. To assess the living condition in rural areas, the agricultural survey conducted in the 1890s is a useful source of information. It says that Pilsen's agricultural sector provides sufficient resources for a respectable life for both families and individuals, but lagged behind the urban areas in providing the prospect of future employment, mainly due to the declining agricultural sector.[10]

Overall, by the last two decades of the nineteenth century, Pilsen was a developed town with flourishing industrial and service sectors. As a consequence, it became an attractive destination for migration. Although people from all over Bohemia were moving to Pilsen, most of the incoming population came from the nearby districts of Rokycany, Přestice, Klatovy, Stříbro and Kralovice. They were coming either as commuters, staying during the week and returning home for the weekend, or as permanent migrants, finding jobs in a variety of firms. As we saw in the previous paragraph, the surrounding rural areas provided conditions for a respectable life but lacked the prospect of employment opportunities. The main attractions of Pilsen were a burgeoning industrial sector and the prospect of earning higher real wages.[11] But was the real wage gap the only reason to migrate to Pilsen? For the theoretical reasons discussed in the previous section, we must consider the possibility that children's prospects also played an important role. Two channels were proposed, one through child labor and the other through children's education. As for the first, we need to know more about family income and child labor; the second requires the knowledge of educational facilities in Pilsen

[9] Bělohlávek, 'Plzeňské vesnice'

[10] Výsledky šetření.

[11] Chylík, 'Hospodářský rozvoj', Jíša, *Škodovy závody*.

and its hinterlands. We will first examine family income and child labor, and in the next section we look at the educational facilities.

To examine family income, ideally one would like to have disaggregated, accurate information (as in Horrell and Humphries, 'Women's Labor Force'). Such data are unfortunately extremely rare. For Pilsen, in the absence of such data, family income can be calculated by summing the wages of husband, wife, and working children. We are fortunate that the Chamber of Commerce of Pilsen collected information on nominal daily wages for men and women by occupation and industry. We are also lucky that the Chamber of Commerce of Pilsen recorded the nominal daily child wage, though not by gender. The comments to the reports of the Chamber of Commerce indicate that the nominal daily child wage is the average of the wage of boys and girls. In addition to the Chamber of Commerce reports, the statistical office of the Habsburg monarchy collected information on nominal agricultural wages and insurance statistics that provide monthly nominal industrial wages in the districts around Pilsen that was then used to calculate the daily wage. Furthermore, we possess data on the living expenses of Czech families in industrial centers and rural areas that can be used to calculate a rural-urban cost-of-living ratio. This makes it possible to compute a family's expected real rural and urban income, and thus the rural-urban gap in expected real family income. It also makes it possible to calculate children's contribution to family income and thus more accurately assess whether child labor might have affected family migration.

What were the employment opportunities in Pilsen? There were many. Men could work in the rapidly growing machine-building sector, in the metal industry, or in the flourishing beer industry. Although not as rapidly growing, the glass and textile industries also still provided many job opportunities. Women could work in textiles, food, or chemical industry. Child labor was limited by child labor laws. The most important was passed in 1885 which forbade children from working before age 14, and which was effectively enforced.[12] The law stipulated an important distinction between rural and urban areas by allowing farms to employ children age 12 and above.

[12] Houser, Dětská práce.

INSERT TABLES 1 and 2 HERE

In Pilsen, youngsters older than 14 could have worked in an occupation called "young assistant" *(mladistvý pomocník*) which was a day-laborer below the age of 18. The other possibility was to become an *učeň*, an apprentice working with a master to learn industry-specific skills. Such an apprentice was paid a small wage and might also live with the master. Unfortunately, the Chamber of Commerce in Pilsen only provides information on daily nominal wages for *učeň* in the glass industry, which averaged 0.09 Florins. But it is reasonable to assume that the ratio between the wages of *učeň* and those of "young assistants" did not vary greatly across industries, which would give the result that the average daily nominal wage of an *učeň* was only 45 percent of that of a "young assistant". Tables 1 and 2 show family income in Pilsen and its adjacent regions in three different situations: when only the male household head works (column I), when both husband and wife work (column II), and when both parents and one child as an unskilled laborer work (column III).[13] Since the adjacent regions were a mixture of farms and industrial firms, we consider the agriculture and industry sectors in these regions respectively. We see that the man's contribution to rural family income is 57 percent, the woman's 23 and the child's 19 percent. In Pilsen, the man's contribution is 61.5 percent, the woman's 23.1 percent and the child's 15 percent. In the nearby industrial districts, the man contributes 64 percent, the woman 24 percent and the child contributes 12 percent.

INSERT TABLE 3 AND 4 HERE

[13] The calculation of the average male and female nominal daily wage in Pilsen is described in detail in the notes to Table 1. The calculation of the average nominal daily wage in agriculture needs a more detailed explanation. I use the nominal wages of agricultural laborers as reported in Karl and Theodor, 'Die landwirthschftlichen Arbeiter'. The nominal daily male and female agricultural wage for the Pilsen region is computed as the average of nominal daily wages (by sex) in the five political districts of the region. Although a weighted average might be preferable, we do not have information on the proportions of males and females working in agriculture. But since the wages did not vary greatly and it is reasonable to assume that the share of male and female agricultural population did not differ significantly across the five districts, the weighted average would not be very far from our simple average. The agricultural nominal daily wage does not include payments in kind; therefore we should consider it as a lower bound. I assume 255 working days.

Tables 3 and 4 reveal that in the case when only the husband worked, the nominal income gap between Pilsen and the rural hinterlands and between Pilsen and the industrialized hinterlands was 60 and 50 percent, respectively. A family in which both parents and a child worked faced a nominal income gap of 49 and 44 percent, respectively. The gap must then be adjusted for the costs of living. We have information on the living expenses of a family living in rural and urban areas of the Czech lands in 1879.[14] Assuming that the ratio did not change a great deal**,** the real rural-urban family income gap was approximately 25 and 20 percent, respectively. There are two issues related to the costs-of-living which need to be addressed. First, a migrant could become unemployed when moved to Pilsen, which would then increase his/her costs-of-living. While certainly possible, historical sources often state that unemployment was low in Pilsen at that time (Daněš, 'Obyvatelstvo království', Chylík, 'Hospodářský rozvoj'). Second, the issue of the disamenities of urban life such as high infant mortality and unhealthy environment would have to be accounted for with estimates of urban disamenities. Indeed, towns suffered from high infant mortality and sanitary problems.[15] Pilsen was no exception, implying that similarly to unemployment, the problems of an urban environment would increase the costs of living in Pilsen. Therefore, we should regard the calculated family real rural-urban wage gap as an upper bound.

Overall, three important observations stand out from the discussion in this section. First, there was a rather significant increase in real family income by moving to Pilsen. Second, a family could expect an increase in its real income even without child labor. This presented a window of opportunity for the family to send children to school rather than to work. Lastly, apprenticeship did not provide a significant source of income for a family, which means that sending a child to become an apprentice very likely had to do with investment into the child's practical education rather than with child labor.

[14] See Purš, *Changes in the Standard of Living*. The family consists of a man, a wife and three children. The living expenses include food, clothing, rent, heat, light, domestic furniture, health insurance, and school fees.

[15] see e.g. Weigl, Demographischer Wandel.

## IV

This section provides a closer look at the educational opportunities open to children in Pilsen and its hinterlands. The educational sector was framed by the education laws passed in 1869, which stipulated compulsory school attendance between the ages of six and fourteen. In 1881, an amendment to the school law was passed that allowed compulsory education for children in rural areas to be two years shorter. The educational sector offered the following educational path. Compulsory education started at age six, when a child would attend a primary school for five years. After that, there were several options open. One was to go to a so-called Burgerschule for three years. This was a practically-oriented school aimed at those who did not wish to continue on to secondary education. After Burgerschule, they usually began working as unskilled laborers or apprentices. Those who wished to continue to secondary school could go from a primary school directly to either a Realschule or a Gymnasium. The gymnasium was aimed at students who would then continue their study at university, graduating usually as lawyers, teachers, or doctors. Realschule, on the other hand, was aimed at students who would attend technical universities and become engineers. Those who did not intend to go to university, but wanted to have a secondary education, could attend business schools or various vocational schools. They would then become either clerks working in banking, insurance or trade, or technicians and middle-rank managers in industrial firms. In addition to this, there was one more option: apprenticeship. Apprenticeship took two to three years during which an apprentice worked with a master, learning industry-specific skills that were very important for becoming a skilled laborer. Apprenticeship also included two to four hours a week of apprenticeship training in a so-called evening continuation school, which ended with a final exam. Entering a secondary school as well as a university required an entrance exam. Becoming an apprentice was also not automatic but required a prior arrangement with the master who could accept only a limited number of apprentices. Primary school opportunities did not differ for boys and girls since Pilsen offered an equal number of schools for both genders.[16] As for apprenticeship, Pilsen Chamber of Commerce reports indicate the differences due to the industrial structure of Pilsen. Indeed, the

[16] Popis školního okresu plzeňského.

expanding steel-making industry and railway workshops provided ample opportunities mostly for boys. However, one can not say that girls' apprenticeship opportunities were severely limited. On the contrary, girls could have been trained in the food, leather and shoe industries. In addition, the emerging clothing industry also provided opportunities to become an apprentice, and Pilsen offered evening continuation school for girls to learn industry-specific skills.[17]

The theoretical section argued that there were differences in the quality of primary education between rural and urban areas and that there were more secondary education facilities in urban than rural areas. There are several measures that can be used to compare the quality of primary education such as pupil-teacher ratio or school expenditure per pupil. In an historical context, they are usually difficult to obtain. We are however lucky and using the data published in the reports of the teachers in Pilsen in 1896 we can calculate the pupil-teacher ratio for Pilsen and the villages in the nearby districts.[18] The ratio was 30 to 1 for Pilsen and 45 to 1 for the villages. Anecdotal evidence shows that the "one-room schoolhouse" was still widely spread in rural areas at this time. Moreover, teachers in rural areas were often underpaid and shirked on their duties, and school buildings were in poor condition and lacked necessary equipment as opposed to teachers and school buildings in cities.[19] Additional insight into the differences between the rural areas and Pilsen is provided by the data on the expenditures on education in Pilsen and the surrounding rural areas in 1900 collected by the statistical office of Bohemia. [20] The data show that per capita expenditures on education in 1900 are about 80 percent higher in Pilsen than in the surrounding rural areas. The difference is rather substantial, and it supports the available qualitative evidence. All this indicates that Pilsen provided a higher quality of primary education than rural areas.

As for secondary education, the differences between Pilsen and the hinterlands were profound. Considering just the number of secondary education facilities, Pilsen supercedes its nearby districts. In Pilsen, there were two Gymnasia, two Realschule, nine vocational schools, a teacher-

[17] *Statistische Bericht.*

[18] *Popis školního okresu plzeňského.*

[19] Kodetová, *Zemědělské dělnictvo*, Somr, *Dějiny školství*, Vošahlíková, *Jak se žilo*.

[20] *Zprávy zemského statistického úřadu Království českého IX*.

training school, an agriculture school, and a business academy. On the other hand, there were only a handful of secondary schools in the nearby districts. Specifically, there was an agricultural school and a vocational school for girls in the nearby district of Rokycany and an agricultural school and vocational schools for boys in the town of Žakava and in the small towns of Spálené and Radnice. This suggests that children in the hinterlands had limited opportunities to acquire secondary education. Parents could send their children to school in Pilsen, but since student boarding facilities were not common, we can be fairly certain that this was not widespread. One may ask how realistic the option of secondary education was for the migrants. The historical literature on Pilsen hints that the secondary education was in demand because it enabled to continue at the university. However, the university education was still not wide spread in Bohemia at that time (though it was gaining on the importance), was costly, and the therefore we need to be cautious to consider the secondary education as a realistic choice embraced by the migrants.

Other than secondary education, apprenticeship was another way of obtaining higher education by acquiring practical skills from a master and becoming a skilled worker, earning more than unskilled workers. There was not much of a difference in the apprenticeship opportunities between rural areas and Pilsen.[21] Was there a quality difference? We have reason to believe that apprenticeship in rural areas was of lower quality than apprenticeship in urban areas. Firstly, apprenticeship in rural areas involved a substantial amount of agricultural work in addition to the learning of industry-specific skills. The reason was that the rural masters very often supplemented their income with farming and used their apprentices as cheap agricultural labor, especially during the summer.[22] This is not to say that apprentices in the urban areas did not perform other work, often domestic work, in addition to the learning of industry-specific skills. Indeed, historical accounts suggest that it was not unusual for an apprentice to perform sometimes the work of a domestic servant.[23]. However, the extent of the work not directly related to apprenticeship in urban areas was likely to be lower than in rural areas mainly because urban masters were likely less involved in

[21] Bělohlávek, 'Plzeňské vesnice', *Dějiny Plzně II*.

[22] Bělohlávek, 'Plzeňské vesnice', Kodetová, *Zemědělské dělnictvo*.

[23] See e.g. Vošahlíková, *Jak se žilo*.

agriculture than rural masters. Secondly, masters in urban areas had access to new technology more often than masters in rural areas. An apprentice in a small scale factory in Pilsen was more likely to work with the most advanced technology than an apprentice in a smith workshop in a hinterland village. Therefore, an apprenticeship in a town like Pilsen very likely provided a better, more up-to-date training than an apprenticeship in a rural area, producing apprentices with qualitatively higher skills.[24] We see that children in Pilsen had more opportunities to acquire education and become skilled workers than children in the hinterlands. Do these opportunities materialize into higher wages for skilled workers in Pilsen than in the hinterlands? To answer this question, we would need to estimate the returns to education in Pilsen and the neighboring districts. Unfortunately, this is impossible due to lack of data. Usable proxies would be returns to education in other industrial towns and districts in Bohemia, but these are not available either. The only returns to education estimates are for bank clerks in Prague in the nineteenth century.[25] Nevertheless, to get at least a flavor of the possible gains from higher education (acquired either in the vocational schools or continuation schools) we can examine the male skilled premium. The report of the Chamber of Commerce in Pilsen allows us to calculate the male urban skilled nominal daily wage in 1889. The calculations show a skill premium of around 55 percent. We can also calculated the skilled premium in Pilsen and the neighboring districts in 1898 and the calculation show a skill premium of almost 40 percent.[26]

[24] *Dějiny Plzně II*.

[25] Cvrček, 'Business Education'.

[26] The skill premium is computed as (skilled nominal wage – unskilled nominal wage)/skilled nominal wage. The data sources are the ones stated in Tables 1 and 2. The male urban skilled nominal daily wage was calculated as the weighted average of nominal daily wages of urban skilled male workers in the same industries which were used to calculated the male urban unskilled wage; weights are the shares of male employment in the corresponding industries. This premium does not apply to professionals, since the skilled wage refers to skilled workers only. However, we can be certain that the premium from being a professional would have been even higher. Unfortunately, it is not possible to calculate the female skill premium since the data sources do not provide sufficient information on the female skilled wage. As for the rural skilled occupations, we have only scattered information that unable us calculate a sound rural skilled wage. The rural skilled occupations include the skilled industrial workers employed by a small rural industrial sector and the skilled workers working on large estates.

In summary, the two preceding sections showed that Pilsen was an attractive destination. The growing industrial sector provided ample job opportunities for rural migrants that offered higher wages for all family members. An important result of our analysis is that even without child labor a family leaving the hinterlands could expect between a 20 and 25 percent increase in real income, depending on whether it came from the agricultural or rural non-agricultural sector. Pilsen also offered a higher quality of primary education and more secondary education opportunities than rural areas, which materialized into a 40 percent skilled premium as opposed to 22 percent in the nearby districts. Children who moved to Pilsen thus faced brighter prospects than their rural counterparts. First, they could earn higher wages as unskilled laborers. Second, they had more opportunity to become educated by studying in high quality urban primary schools and continue in various secondary education facilities, which would then earn them a substantial skilled premium. All this presented an impetus for families to move to Pilsen and consider education, along with wage gains, seriously. Did migrant families do so? The rest of the paper empirically addresses this question.

## V

This section describes the dataset used in the regression analyses. Data from the manuscript returns of the Habsburg monarchy decennial population census of 1900 were collected and put into electronic form. The dataset consists of 1300 families that include the migrant population of the Pilsen's industrial neighborhoods, together with the population of "stayers" (non-migrants) from the political districts in Bohemia where the migrant population originated.[27] At this point, a clear description of Pilsen's industrial neighborhoods is needed. The city of Pilsen consisted of a city center surrounded by neighborhoods. The city center included the city and municipality offices, the service sector, and a very small percentage of inhabitants. The neighborhoods developed around the city center in a circular pattern and they accommodated most of the population and most of the firms were located there.[28] Given a rather fast pace of growth, the city's formal boundaries did not always

[27] The dataset includes migrants from industrial neighbourhoods Lobzy and Skvrňany.

[28] An exception is Škoda Pilsen and its two divisions producing armoury for the Habsburg monarchy army.

correspond with the actual boundaries of the city. Therefore, we may find that some of the neighborhoods were officially not part of Pilsen. For example, the most prosperous and populated part of Pilsen—Skvrňany—with the population working mainly in the largest Pilsen factory, Škoda, was officially not part of Pilsen. This, however, was not an issue, neither for contemporary Pilsen inhabitants, officials, nor contemporary newspapers.[29] Also, Czech historiography considered Pilsen as consisting of the city center and the surrounding neighborhoods irrespective of their legal status.[30] Therefore, including migrants from such an industrial neighborhood does not challenge the dataset being a representative sample of migrant families moving to Pilsen.

The population of stayers was collected as a stratified sample.[31] The data collection faced three problems. First, several districts sent only one or two families to Pilsen, which precluded making any reasonable statistical inferences relating to these districts. This problem was solved by grouping districts with very few observations together. To prevent the mixing of heterogeneous districts, grouping was carried out on districts with similar demographic profiles. The manuscript returns provide information on the date of birth, place of birth, occupation, literacy, and family kinship. The returns usually underreport occupation, which might be because most of the population was employed in agriculture. The date of birth and family kinship enabled me to see the family structure as well as the age profile of stayers. We can base the grouping of the districts on both of these demographic characteristics. It turns out, however, that the family size is similar among the families with household heads of a similar age. Therefore, I grouped together the districts with a

[29] See e.g. Chylík, 'Hospodářský rozvoj'.

[30] *Dějiny Plzně II*, Janáček, *Největší zbrojovka*, Jíša, *Škodovy závody*.

[31] The control group is also constructed such that it does not include villages that experienced severe depopulation due to out-migration. The reason is that the sample of stayers in those villages is biased toward the older population, whose age-profile does not match the age-profile of migrants. The downside of this is that those villages might have different local conditions than the villages included in the sample, and hence their migrants might have been different than the rest of our migrant population. I have compared the age-profile of those migrants with the rest of the sample and there were no profound differences. Nevertheless, it could be that the migrant population from the excluded villages has different unobservable characteristics than the rest of our migrant population. This might pose a problem since we cannot control for it. However, the share population of migrants coming from the excluded villages is rather low: they come from south Bohemia and represent 3.1 percent of the sample of migrants. Therefore, I have excluded them from the sample.

similar age structure of household heads. The second problem was that the manuscript returns for a handful of districts did not survive. This was solved by using the manuscript returns of adjacent districts with similar demographic profiles as a proxy for the missing ones.

A final problem was the enormous costs of data collection. Ideally, one would wish to have all the manuscript returns in electronic form or centralized in one place. This is not the case for Bohemia's manuscript returns, which are geographically dispersed in local archives all over Bohemia, with the manuscript returns of each village of each political district stored separately, making it virtually impossible to group them together and perform random sampling. While the geographical dispersion could not be overcome, the challenge of random sampling was overcome by first randomly choosing villages from a particular political district and then gathering a random sample of the population from those villages.[32]At this point it needs to be mentioned that the availability of the original manuscript returns is not usual for the Habsburg monarchy. The original data had often been destroyed after the aggregated data were published and we are lucky that the manuscript returns for Pilsen and the hinterland villages survived.

The manuscript returns record name, date of birth, place of birth, occupation, and literacy, as well as the year the individual began living in Pilsen and information on family kinship. Hence, for each individual we have two dates and kinship information to provide a picture of the family when it arrived in Pilsen. For example, Jan Chrastoň was born in 1865 and resided in Pilsen from 1896 onward. He had a wife who was born in 1870 and arrived in Pilsen in 1896 and two daughters born in 1894 and 1895, residing in Pilsen since 1896. Thus, we have a picture of the Chrastoň family, consisting of a married couple who were 31 and 26 and two daughters aged 2 and 1 when they

[32] Most of the migrant families came to Pilsen from the surrounding districts. There are, however, some families that came to Pilsen from various places in Bohemia as well as outside Bohemia. The manuscript returns lacked county of origin for the families coming from outside Bohemia and eastern Bohemia; hence they were excluded from the sample. The migrant families from the midlands were also excluded because it was not possible to identify a corresponding group of stayers since the manuscript returns for the midlands were missing. This, however, does not pose a problem since the remaining migrant families constitute almost 85% of the overall population of migrant families.

migrated to Pilsen.[33] This provides a unique dataset making it possible to reconstruct the age, and gender of each family *at the time of arrival*. Before I discuss the use of this dataset, one issue related to the number of children in a family recorded in the manuscript returns needs to be addressed. The number of children is the number of children a family had on the day of census. It does not include the number of children who died before the census day, which means that the number of children of migrants could have been different on the day of census than on the day they moved to Pilsen. This, however, does not have a substantial impact on our results since we are interested in the effect of children's specific age and occupation on the likelihood of migration.

Using the dataset raises a couple of issues. First, the dataset includes only families that came to Pilsen and stayed there until the day of the 1900 census. It is entirely plausible that urban conditions were difficult for some families, motivating them to return, move to another place, or dissolve. It is impossible to address this issue with the present data. Greater frequency data would remedy the situation, but they are not available. Therefore, the question asked needs to be limited to permanent movers. Second, a relevant comparison group to migrants needs to be found. The sample consists of migrant families that arrived to Pilsen over a thirty-year period. Ideally one would wish to have a sample of stayers covering the same time period. Unfortunately, data sources do not allow us to do so and I could collect the sample of stayers only in 1900.[34] Therefore, I was left with two options. First one was to use stayers in 1900 and either all migrants coming to Pilsen between 1870 and 1900 or migrants coming to Pilsen in any sub period, for example 1890-1900. The second was to use stayers in 1900 and migrants coming to Pilsen in 1900 only. As for the first option, there was a

[33] Information on the year of arrival to Pilsen provides an opportunity to see if a family arrived together or sequentially. For example, it could be that first the husband migrated, followed by his wife and children a year later. This situation, however, was observed only in very few cases, making it impossible to conduct any sensible quantitative analyses. It is possible that this pattern was in reality rare, or alternatively that the census enumerators automatically reported the same year of arrival for all family members; this would imply that the age of wives and children at arrival might be a lower bound.

[34] The manuscript returns for the period 1860–1890 are often incomplete making it impossible to construct a corresponding sample of stayers. The returns were either lost or destroyed during a turbulent period that included the dissolution of the Habsburg monarchy, two World Wars, and the rise and fall of the communist regime.

risk that the analysis would be biased. One could argue that since the demographic transition in Bohemia accelerated only after about 1900, we can be fairly sure that the family structure of stayers was not dramatically changing. This would then mean that using the population of stayers in 1900 and the population of migrants arriving to Pilsen until 1900 will not severely bias the analysis. However, we have very limited knowledge about the demographic behavior of families in Pilsen and its hinterlands at the end of the nineteenth century. Thus we can not safely use the demographic behavior of the whole Bohemia as a proxy since it might conceal those features of the demographic behavior of families in the Pilsen region that are different from the demographic behavior of the whole Bohemia. Therefore, I have decided follow the second option and to use stayers in 1900 with migrants coming to Pilsen in 1900 only.[35] As a sensitivity analysis, I have still performed the analysis with migrants coming to Pilsen in 1890-1900 and in 1900 respectively. The results in both cases were very similar, though the significance of some variables has marginally changed. This implies that we can be reasonably confident that using the population of stayers in 1900 and migrants in 1890-1900 would not severely bias the analysis. Despite this, the data set with migrants coming to Pilsen in 1900 yields more precise results and therefore below I discuss and report the results for this data set only.[36]

INSERT TABLE 5 and 6 HERE

Table 5 shows the basic statistics of the sample. We see that stayers were older than migrants, which confirms the life-cycle aspect of migration. The consequence of younger migrant parents is younger migrant children. Migrants have also fewer children than stayers which is not surprising given the fact that migrants are younger than stayers. An interesting observation is that the average

[35] The control group, as explained above, is constructed such that it does not include villages that experienced severe depopulation due to out-migration. Thus, the control group is not biased toward an older population but includes a population that might have migrated but decided to stay. Also, excluding migrants arriving to Pilsen before 1900 does not decreases the sample size since they constitute only nine percent of all migrants.

[36] The results of the analysis with migrants coming to Pilsen in 1890-1900 are available from the author upon request.

age of a migrant's children is around six, which is the age when compulsory primary education begins.

Table 6 shows the occupational structure of parents and their offspring between the ages of 6 and 18 for migrants and stayers. The table distinguishes between skilled workers, unskilled workers and daily laborers, though daily laborers are also unskilled workers. This distinction is limited to the industrial sector only because the census records do not provide enough of information to do the same for the agricultural sector. The reason for having a special category of daily laborers is to distinguish between the unskilled laborers who likely worked full time and the unskilled workers who were more exposed to the uncertainties of the labor market by being rehired on daily basis. Not surprisingly, the migrants did not take any agriculture occupation after arriving in Pilsen and most of them worked as skilled workers. There are gender differences between the migrants and the stayers as well as among the migrants and the stayers. The female household heads in the hinterlands do not occupy any skilled position or the position of a day laborer unlike the male household heads in the hinterlands; the female household heads who migrated to Pilsen are not employed in agriculture unlike those who stayed in the hinterlands, and most of them work in skilled occupations. The comparison of the female household heads in Pilsen with their male counterparts shows that the second most prevalent female occupation is day laborer, while the same occupation ranks third among the males. The gender comparison here merits caution because of the under-representation of the female household head's occupation. Indeed, the census records do not provide any information on 47 percent of the female household heads.[37] The under-representation of females also prevents us from saying anything with certainty about the occupation distribution of wives. As we see, most of the wives' occupations were recorded as 'working at home', which means 'housewife'. This category, however, was very likely broad and included paid work done at home as well as part time jobs, as indicated by the sporadic notes next to the wife's occupation in the manuscript records.[38]

[37] This does not cause problems in the subsequent analysis because the sample includes less than 5 percent female household heads.

[38] I did not include the sporadic notes into the dataset because their infrequency prevents any sound empirical analysis.

As for the children, most of them are in primary school. It is interesting to point out that in the case of primary school, gender differences are small though the share of girls is slightly lower than the share of boys. Also, when we compare the children of migrants with those of stayers we see that the differences are rather miniscule, though the share of stayers' children is lower than migrants'. On the other hand, there is a considerable difference between the migrants and the stayers when we look at secondary school and apprenticeship. The children of migrants are more prevalent in both secondary schools and apprenticeships than the children of stayers, and more boys than girls are in secondary schools and apprenticeships. It is worth pointing out the difference between migrants and stayers regarding the share of girls and boys in apprenticeship occupations. We see that the share of girls is three times higher among the migrants than the stayers, while the share of boys is only twice as high among the migrants as the stayers. The gender comparison again requires caution because of the large share of the girls for whom the census did not record their occupation.

INSERT FIGURE 1

Since our analysis is based on the timing of migration with respect to the age of a child, it is useful to provide the distribution of the oldest childs' ages at the time of migration. Figure 1 shows that there are three spikes in the distribution: age 6, age 11, and age 14. The clearest spike is at age 11, which coincided with going to Burgerschule. Age 6 was the time when a child was ready to begin primary education and we see that there is an increase in the share of children at that age. However, we need to be careful here because the share of children at the age of 6 is only slightly higher than the share of children younger than 6. On the other hand, we see a dramatic drop at the age 7, 8, and 9, which indicates that the family is less likely to migrate to Pilsen *after* its oldest child begins his/her primary education. This indeed suggests that the timing of migration is connected to educational milestones, which is reaffirmed by the increase in the share of children reaching the age of going to Burgerschule.

## VI

The theoretical section suggested two empirical strategies to examine the role of children's educational attainment in family migration decision-making: the first is to look at the age composition of children in families on arrival to Pilsen; the second is to look at the occupation of children on arrival to Pilsen. This section discusses these empirical strategies in detail. Also, it presents the regression results, and discusses their robustness and the econometric issues we need to aware be of.

The first empirical strategy comes from the idea of the maximization of children's school attendance in urban areas. As was argued in the section on education, urban areas provided a higher quality of education than rural areas. To maximize children's educational attainment in the town, parents should migrate when their children are about to start compulsory education. Since the school laws stipulated compulsory primary education from the age of six, families with a child at that age should be, *ceteris paribus*, more likely to migrate than families without such a child. Another important age is when a child finishes the first stage of primary school and continues at Burgerschule. This implies that families with a child at the age of eleven should be more likely to migrate as well, keeping other factors unchanged. Burgerschule lasted for three years and usually during the last year, children started working as apprentices. Therefore, the age of thirteen is also an important age for children from the point of view of acquiring practical skills. As a consequence, the presence of a child at that age might also be, *ceteris paribus*, an impetus for a family to move to an urban area and hence provide an opportunity for a child to acquire human capital in form of practical skills.

The main challenge of this empirical strategy is the treatment of families with multiple children. If, for example, I find a positive and significant effect of children around the age of six, eleven, or both, I cannot be certain that the maximization of the time a child attended school in an urban area was a migration factor. It could be that, for example, a family has also a fourteen year-old child for whom migration to a town would give an opportunity to earn a higher wage in the industrial sector and therefore the estimated coefficients could capture the effect of that fourteen year-old sibling, too. Or, a family could have a child at pre-school age and a positive and statistically significant effect of a child at the age of six or eleven can be simply because the six or eleven year-old

child is considered old enough to help with younger siblings, and thus allowing the mother to take advantage of the higher wages in Pilsen when they moved. Therefore I need to control for the presence of other siblings, both younger and older. To provide a robustness check of the results and support the interpretation of the estimated coefficients on specific school-age dummies, I conduct an additional regression analysis: first, I consider families with only one child; then I analyze the effect of the oldest child.

The regression equation takes the following form:

$$P(y_i=c) = f(x_{i1}\beta_1 + x_{i2}\beta_2), \qquad (1)$$

where $c$=[0, 1] indicates whether the family is a migrant family or a "stayer" family, $x_{i1}$ is the set of family $i$ socio-demographic variables and $x_{i2}$ is the set of children's age indicator variables for family $i$. The set of family socio-demographic variables includes the age of the parents, the square of the age of the parents, the occupation of the household head, the number of children, and county of origin indicator variables. The set of children's age indicator variables contain variables indicating the presence of school-aged children, variables for children at the age 5 and less, 6, 7–9, 10, 11, 13, and older than 14. The occupation of the mother could not be included because of virtually no variation in the wife's occupation—in almost all cases, working at home was reported. This is due to the underreporting of women's occupations, which is often the case in historical population censuses. I estimate five different specifications, all with county of origin indicator variables, which are presented in Table 7.[39] The first one examines the presence of school-aged children, the second investigates the presence of a child aged six in one-child families, the third investigates the presence of children at various school-ages in families with more than one child, and the fourth and fifth examine the presence of the oldest child at age six and eleven, respectively. In all regression equations, the probability of migration decreases with the age of the parents up to a certain point and then increases. This is in accordance with a life-cycle prediction that migration is predominantly undertaken by

[39] Since the dataset takes the form of a clustered sample, statistical inference based on methods that rely on random sampling may be incorrect because errors may be correlated within clusters. For this reason, an estimator of standard errors is used that relaxes the assumption of independence within clusters. Clusters in this case are the political districts (see for example Pepper, 'Robust Inferences'). Also, in all regressions, migrants are evaluated at the time of arrival to Pilsen.

young adults who are at the beginning of their life-cycle, and then at later ages because parents follow their migrating young-adult offspring. The occupation of the household head is positively related to migration, which is not a surprise given the substantial real rural-urban wage gap.

In all regressions, too, the number of children has a negative impact on the probability of migration. Child labor can explain this effect in two possible ways. First, it may be that children's productivity is higher in agriculture than in industry. This would imply that the marginal benefit of an additional child is higher in rural than urban areas, so an additional child deters family migration to the town. Second, it may be that since child labor laws prohibit urban children from working, families cannot offset the higher cost of child raising in urban areas relative to rural areas, so an additional child deters family migration to the town. The first explanation does not hold in our case, since the productivity of children was higher in Pilsen than in the hinterlands. The second, however, seems plausible. Child labor laws prohibited children in Pilsen from working until age 14, and the cost of living was higher in Pilsen than in the hinterlands. Even though Pilsen offered an urban wage premium, large families would have problems to offset the higher cost of raising children.

INSERT TABLE 7 HERE

The first regression (column I) examines the presence of school-aged children interacted with the number of children. The "school-aged children" variable has a positive but insignificant impact on the probability of migration. The positive impact of school-aged children suggests that children's education might play a role in family migration. However, the insignificance of the result raises doubts about its explanatory power. Indeed, these results do not shed much light on the role of children's education in family migration. School-aged children are those from age 6 to 14, which means that one additional school-aged child could either be one who is at school or one who is 14 and ready to work. Hence, the presence of a school-aged child could mean that the parents are willing to move because the child would get a better education, but could also mean that the parents are willing to move because they have a 14 year-old who could work. Therefore, we have to investigate the age structure of the children in more detail.

The second regression (column II) examines the presence of a six year-old child in one- child migrant families. It shows a positive and significant effect of the presence of a child of age six on family migration. This indicates that, *ceteris paribus*, the presence of a child who is at the age when the compulsory primary education begins is conducive to migration. The result is encouraging, but we need to be cautious. First, the sample size is rather small: only 274 families. Second, our dataset is a cross-section which means that we can not account for an unobservable family effect. Nevertheless, the result is still at least indicative that family migration motives *might* include the maximization of the time a child spends in primary school in an urban area.

The third regression (column III) takes a closer look at the age composition of children in multiple-child migrant families. The regression equation includes variables indicating the presence of children aged 5 and less, 6, 7–9, 10, 11, 13, and older than 14, each interacted with the number of children. The inclusion of age 6, 11, 13, and older than 14 indicator variables follows from the above discussion. The indicator variables for the presence of children less than 5 and between 7 and 9 were included as a direct consequence of the age 6 and age 10 indicator variables. The results of this regression are the following. The presence of children aged 6, 7–9, 11, and older than 14 are significant, having positive signs except for the variable indicating the presence of age 7–9. Other age variables have positive signs but are statistically not significant. Regression results in columns IV and V provide robustness checks of these results. In column IV, the presence of an oldest child of age 6 has a positive and statistically significant effect on family migration, corroborating thus the results of the regression in column II and III. The fifth column presents the results with the age dummies indicating the presence of an oldest child of age 11.[40] In this case, the oldest child variable is positive and statistically significant as well as the age of six variable while the indicator variable age 7-9 remains negative and significant.[41]

[40] I also conducted regression analyses with an oldest child at the age 10, 13, and 14. The coefficients were positive but statistically not significant.

[41] The economic impact of the estimated coefficients can be measured by relating the size of marginal effect to the baseline probability. We see that the marginal effect of a child specific-age variable is around four percent of the baseline probability. This indicates that the economic magnitude of the estimated coefficient is not large.

The regression results show that children's age-specific variables at the educational milestones—age six and eleven—are positively related to family migration and suggest that the parents would migrate to Pilsen to maximize the educational attainment of their children. We need to be, however, careful in drawing strong conclusions because a six year-old or eleven year-old child could have had a unique position in the family that was valuable in the urban area and that is unobservable to us. Indeed, the estimated coefficients might capture other aspects of having children, regardless of the decision to migrate. As a consequence, we need a clearer way of testing our hypothesis that the education of children mattered for family migration decision-making. This would be to test whether the education of children mattered, *conditional* on the decision to migrate. Therefore, the bottom of Table 7 presents the tests of whether various pairs of the estimated coefficients of the children's age-specific variables are equal or not. For example, we test the hypothesis that the coefficient of age 6 is equal to the coefficient of age less than 6. If primary education is really a motive of the family migration, then, *ceteris paribus*, the probability of family migration would be different at a child's age 6 than at an age less than 6. We consider eight age-pairs: 'oldest child at age 6 and younger than 6', 'child at the age 6 and child younger than age 6', 'oldest child at the age 11 and child younger than age 6', 'child at the age 11 and child younger than age 6', 'child at the age 6 and child at the age between 7 and 9', 'child at the age 10 and child at the age 11', 'child at the age 10 and child between the age 7 and 9', 'child at the age 11 and child at the age between 7 and 9'. The reason we consider the pairs with 'child at the age 6', 'oldest child at the age 6', 'child at the age 11', 'oldest child at the age 11', is that we have a separate regression with 'oldest child at the age 6' and 'oldest child at the age 11' (Table 7, column IV and V respectively) and a regression with 'child at the age 6' and 'child at the age 11' (Table 7, column III). We see that all pairs with the estimated coefficient of the age between 7 and 9 are significantly different (at the 1% and the 5% significance levels), while other pairs are not.

What do these results tell us? The insignificance of the difference between the estimates of 'child at the age 6' and 'child younger than the age 6' as well as 'oldest child at the age 6' and 'child

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The magnitude, however, is not trivial either, especially when we think of the economic magnitude of all children at the age that matters, which is 6, 7-9, 11, and 14 and more respectively.

younger than the age 6' suggests that, *ceteris paribus*, the probability of moving to Pilsen when the family has a six year-old child is similar to the probability of moving to Pilsen when the family has a younger child. In other words, having a six year-old child provides a similar impetus to move to Pilsen as having, for example, a four year-old child. Thus, it seems like the parents were equally willing to move to a city at any time before the beginning of primary education. This result is consistent with Figure 1, which shows no dramatic difference between the age 6 and younger than the age 6.[42] Does that mean that a child at the age of six does not bear importance in the family migration decision-making? The other results suggest that this is not the case. There is a statistically significant difference between the estimate of the 'child at the age 6' variable and the estimate of the 'child at the age between 7 and 9' variable that indicates that not arriving in Pilsen *after* the beginning of the primary education was indeed important and that the parents did not want to migrate in the middle of their children's primary education. What about Burgerschule? We see that there is no significant difference between the estimates of the 'child at the age 10' and 'child at the age 11' variables, suggesting that both ages have the same impact on the likelihood of family migration, and indicating that the family was equally likely to locate to Pilsen shortly before or at the age when a child starts Burgerschule. However, when we compare 'child at the age between 7 and 9' with either 'child at the age 10' or 'child at the age 11', we see a statistically significant difference. This tells us that while the family is unlikely to locate to Pilsen when a child is in the middle of primary education, it is likely to do that when a child reaches the age of going to Burgerschule. Putting this and the previous results together we get the following picture of the changes in the probability of migration to Pilsen. *Ceteris paribus*, the family is equally likely to migrate to Pilsen until a child's age of six; after that the

[42] Figure 1 indicates a slight decline in the share of migrant families with the oldest child up to the age 3 and a subsequent increase up to the age 6. Therefore, in the unreported results, I have re-run the regressions in Table 7, columns III, IV, and V with a breakdown of the 'child younger than the age 6' age category into the categories 'child younger than the age 4', and 'child between the age 4 and 6' and tested the hypothesis that the estimated coefficients of these age categories are equal. The test statistics could not reject the hypothesis at the conventional significance levels, but could do so in one case at the 26% significance level. This level is quite large, which suggest that the results are more supportive of the explanation that the family was likely to migrate to Pilsen when the child was no older than the age 7. The regression results are not presented here but are available from the author upon request.

probability decreases. However when a child reaches the age of going to Burgerschule, the likelihood of relocating to Pilsen increases again. This means that the family is willing to move to Pilsen *no later* than the beginning of the primary education, and shortly before or at the time of the beginning of Burgerschule. The insignificant difference between 'child of age 11' and 'child younger than 6' as well as 'oldest child of age 11' and 'child younger than 6' might be a bit puzzling. It suggests that the family views a child younger than age 6 equally with a child at the age 11 when it comes to the migration decision. However, when we realize that, *ceteris paribus*, the family considers the presence of child until the age 6 as a motive to migrate to a town, then the fact that the child at the age 11 is viewed equally with the child younger than the age 6 suggests that the family considers the educational prospect of the eleven year old child equally with the educational prospect of the child younger than the age of six. In other words, the family does not discriminate between the primary education and Burgerschule.

INSERT TABLE 8 HERE

We have argued above that the age 6 variable suggests a maximization of the time spent in urban schools. It might be, however, that the family would move to Pilsen when a child is at the age of five in order to settle in the new location by the start of the school year. Therefore, Table 8 presents regressions similar to the ones in Table 7 columns III, IV and V with a few differences. In particular, the variable 'child at the age 5 or 6' replaces the original variable 'child at the age 6' in column III and V, and the variable 'oldest child at the age 5 or 6' replaces the original variable 'oldest child at the age 6' in column IV. Also, similarly to Table 7, the bottom of Table 8 presents the tests of whether the estimated coefficients of the children's age-specific variables are equal or not. We see that the results of the regression analysis as well as the results of the tests of the age-pairs again indicate that parents are willing to move to Pilsen *no later* than the beginning of the primary education, and shortly before or at the time of the beginning of Burgerschule. One might argue here that based on Figure 1, parents could move to Pilsen even sooner than the age 5, for example at the age 4. Hence, an additional robustness check, not reported here, was performed with a new variable 'at the age between 4 or 6' in

column III and V and 'oldest child at the age between 4 or 6' in column IV. The results showed positive signs but a statistical insignificance of these variables, providing assurance that parents migrated to Pilsen at the age or shortly before the age that their children started primary education.

Did parents take gender differences into account? Table 9 presents the results of the regressions that distinguish between sons and daughters. Every regression specification in Table 7 was estimated with gender indicator variables and only significant results are reported. The results for parents and the number of children are the same as in Table 7. As for the presence of a six year-old child, there was no gender difference, which suggests that parents did not take into account the sex of their six year-old child in deciding whether to migrate. In general, however, the presence of a daughter was an impetus to leave the hinterlands, indicated by a positive and statistically significant gender variable in columns I and II. To see what age daughter mattered, I estimated specific age and birth-order variable variables. The result, reported in column three, show that the presence of a daughter as the oldest child of age eleven has a positive and significant effect on family migration. This indeed indicates that education might be a family migration motive and thus supports the previous results. The reason is the following. We know that all studies on gender differences in the past show that women are much more productive in urban rather than rural areas.[43] This was because they were more productive in industrial and service occupations that required skill and endurance than in occupations requiring upper-body strength such as farming, which was widespread in rural areas. Also, urban areas had weaker institutional constraints than rural areas as villages were better at controlling women's occupation choice. The age of eleven was the age when a child started Burgerschule, which was a stepping stone to either an apprenticeship or an occupation in industrial and service sector. Since the only way to provide a daughter with the education required for working in these sectors was to move to a town, observing that a daughter's presence at age eleven was conducive to family migration suggests that parents indeed took the daughter's education into account.

[43] Ogilvie, *A Bitter Living*, Wegge, 'Network Strategies'.

INSERT TABLE 9 HERE

The theoretical section outlined that the above results can be supplemented by identifying an interesting correlation between labor market status and migration. In particular, we can use a regression analysis to correlate the labor market status of children and family migration. The regression equation takes the following form:

$$P(y_i=c) = f(x_{i1}\beta_1 + x_{i2}\beta_2), \qquad (2)$$

where $c$=[0, 1] indicates whether the family is a migrant family or a "stayer" family, $x_{i1}$ is the set of family $i$ socio-economics variables and $x_{i2}$ is the set of children's occupational indicator variables of family $i$. The family socio-economics variables include the age of the parents, the square of the age of the parents, the occupation of the household head, the number of children, and the county of origin indication variables. The occupation of mother could not be included due to the data limitations, as explained earlier. The set of children's occupation variables includes variables for children over age 14 being unskilled workers, being students and being apprentices. The occupation variables distinguish between sons and daughters to account for the gender differences as seen in Table 6 and discussed in the previous section. I estimate three different specifications, all with county of origin indicator variables. The first regression equation includes the age of the parents, the square of the age of the parents, and the occupation of children variables. The second regression equation adds the number of children as another explanatory variable, and the third the occupation of the father. The preferred specification is the last one since it controls for the family size and the occupation of the farther. The main variable of interest is the apprenticeship variable. The reason is that I need to consider an educational facility that is equally spread in rural and urban areas. This appears to be the apprenticeship: as discussed in the section on education, families that stayed in the hinterlands faced similar conditions with respect to the possibility of sending their children to an apprenticeship as the families that moved to urban areas. Indeed, both rural and urban areas presented opportunities for apprenticeship, although admittedly the quality was likely different, as discussed in the section on education.

Before discussing regression issues and the results in detail, it is important to stress again that the regression analysis serves to provide a *correlation* between the labor market status of migrants' children and family migration with no intention to assign a causal interpretation to the findings. The reasons are explained below and stem from data limitation. Although a causal interpretation provides more insights into the analyzed problem than a mere correlation, the correlation discussed below also illuminates the role of children's education in family migration and hence provides additional support for the findings presented above.

There are a couple of econometric issues that limit the interpretation of the results to correlation as opposed to a causal relationship. First, the fact that the districts surrounding Pilsen provided opportunities for apprenticeship at the end of the nineteenth century is based on a handful of studies.[44] This is not to say that they are not reliable, though, and their findings are similar to the literature on apprenticeship in Bohemia and Austria. Nevertheless, we still need a detailed study that would analyze the apprenticeship in Pilsen and its surrounding districts at that time. Therefore, I would suggest interpreting the estimated coefficient cautiously.

The second issue is the endogeneity of children's occupations. For example, occupational choice may be influenced by the unobservable ability of children and/or parents. Children with higher ability would be more apt for studying than working. Also, high ability parents might send their children to schools rather than to work because they do not have to rely on child labor or because they are able to provide intergenerational human capital transfer that would help the children successfully finish school. At the same time, the unobserved ability of children and/or parents may also influence migration. For example, a family may be more willing to migrate if the children are more able to work and thus cope with the costs of moving into an urban area. Also, high ability parents would be more willing to migrate since they would find an urban job more easily. We can solve this problem either by using an explanatory variable (so-called instrumental variable) which is correlated with children's occupation and not with the unobserved ability of children and/or parents, or by estimating a system of two simultaneous equations. This is, unfortunately, not feasible, because the historical data do not

[44] (Bělohlávek, 'Plzeňské vesnice', *Dějiny Plzně II*).

allow us to do this. Therefore, the regression results should be viewed as a correlation between the occupation of migrants' children and family migration rather than a causal relationship.

INSERT TABLE 10 HERE

The regression results are presented in Table 10.[45] In all specifications, the estimated coefficients of parents and the number of children are the same as in the previous regressions. As for the occupation of children, the coefficient on the apprenticeship variable for a boy older than 14 is highly significant, which indicates a positive correlation between having a son in apprenticeship and family migration. The indicator variable for the apprenticeship of a girl older than 14 is also positive and although it is not statistically significant at a conventional 10 percent level, it is at 12 percent which indicates that a positive correlation between family migration and having a daughter should not be overlooked. These results confirm the picture arising from Table 6 which shows that a male offspring of a migrant family was likely to become an apprentice and that apprenticeship of a female offspring was, though not the most preferred, an important occupation. These results also find a support in the economic situation in Pilsen which provided apprenticeship opportunities for boys as well as girls, as discussed in section IV. The other indicator variables for child occupation—being in school and working in unskilled labor—are insignificant for both boys and girls.

The fact that the occupation of apprenticeship is positively and significantly correlated with family migration while other occupations are not indicates that families did not migrate out of a desire for additional income from a child working in the town or the desire to send their children to urban secondary schools.[46] How can we interpret these results? The insignificance of the "working child"

[45] Since the dataset takes the form of a clustered sample, statistical inference is again based on methods that rely on random sampling may be incorrect because errors may be correlated within clusters. Clusters in this case are again the political districts.

[46] The indicator variable of a boy older than 14 being in secondary school is negative and even though its statistical insignificance cautious us not to put too much emphasis on this result, it corroborates the picture emerging from Table 6 that a male offspring of a migrant family was more likely to become an apprentice than to attend a secondary school.

variable suggests that child labor was not a migration motive. Also, it looks as if parents did not take advantage of secondary education opportunities for their children. Examining the sample more closely, one discovers that the children reported as students were studying in either a Realschule or a Gymnasium. That is, these young people were the ones aiming at a polytechnic or university degree. Once we recognize that university education was not widespread in Bohemia at the end of the nineteenth century and was costly, as discussed in section IV, these results cease to be so surprising. They no longer indicate that parents did not want to invest into their children's education. Indeed, the strong significance of the male apprenticeship variable and almost significant female apprenticeship variable indicate the exact opposite. Being an apprentice meant that a child was in the position to obtain a valuable education in the form of high quality practical training, which would then make it possible to become a skilled worker. The strong significance of the apprentice variable is in accordance with the labor market situation in Pilsen. As was stated in the section on Pilsen, industrialization exhibited flexible form specialization rather than mass production, which implies that apprenticeship was highly valuable. Thus finding that being an apprentice in a migrant family is positively correlated with family migration suggests that the migrant parents did indeed take their children's future careers seriously and invested into their human capital. At this point it needs to be mentioned that apprenticeship is usually connected with the migration of individuals and there are several historical studies on apprenticeship that identify it as a widespread form of individual migration.[47] Indeed, young men were leaving families to live in masters' houses; young women were leaving families to become domestic servants living in employers' households.[48] Historical studies provide arguments for a stronger correlation between apprenticeship and individual migration than between apprenticeship and family migration and one could safely argue that apprenticeship caused individual migration. The results presented in this study suggest that there is a correlation between apprenticeship and family migration and future research is warranted to examine this in detail.

To sum up, there are two sets of results. One, coming from the regressions in Tables 7, 8 and 9, shows that the presence of a child at age 6 and 11, respectively, is conducive to family rural-urban

[47] See e.g. Ehmer, 'Worlds of Mobility', 'Journeymen's Migration'.

[48] See e.g. Fauve-Chamoux, *Domestic Service*.

migration. The result is robust to various other specifications and sample size which suggests that the maximization of school attendance might indeed enter family migration decision-making. However, we still need to be cautious here because our tests in Table 7 and 8 revealed that families were equally likely to migrate with a child up to the age of six, suggesting that a child at the age of six did not play as important a role in the family as the regression results suggest. Nevertheless, the tests in Table 7 and 8 also revealed that the family was reluctant to move Pilsen later than the beginning of primary education, and that the likelihood of relocating to the city was even decreasing as children were already in the primary schools. This indicates that the educational milestones played a role in the family migration decision-making. The second set of results, coming from the regressions in Table 10, shows that children's practical education played a significant role in the family rural-urban migration decision as we have seen that the variable for children in apprenticeship was highly statistically significant. This conjecture is supported by the insignificance of the variable for children working as unskilled laborers and the variable for children at school. Even though this result needs to be interpreted as a correlation rather than causal relationship, it is consistent with the previous results and corroborates the overall finding that children's education might be one of the family migration motives.

Before we conclude, it would be useful to discuss the results of other studies on migration in Bohemia as well as the results of micro-level studies on migration in other countries. There are several migration studies which examine the internal migration in Bohemia.[49] They show that the expanding industrial and service sector was positively correlated with internal migration, that the agricultural sector acted mostly as a push factor and suggest that the expanding service sector had a positive effect on migration of women.[50] The role of the agricultural sector in the internal migration has been reexamined recently and the results show that the migration was not confined to an outflow

[49] See e.g. Fassmann, 'Emigration, Immigration', Ehmer and Zeitlhofer, 'Ländliche Migration', Komlosy, *Grenze und ungleiche*.

[50] Fassmann, 'Emigration, Immigration'.

of rural migrants to the growing industrial centers.[51] On the contrary, agricultural areas were engaged in an active exchange of migrants too.

There are several micro-level studies on family migration in the nineteenth century U.S. which link the demographic characteristics of the family to the probability of family migration. A study of Steckel on rural-urban migration fails to find a significant negative effect of the household's age on migration.[52] He finds, however, a negative effect of an additional child, which is in tune with this study. Steckel's study also analyzed the specific effect of children's age in the context of rural-urban migration. He shows that children younger than 10 impaired migration and interprets it as the effect of the high urban costs of raising children.[53] Another study that looks at family migration was conducted by Galenson and Pope.[54] They analyze family migration to the farming frontier and find the decreasing probability of migration with the age of the household head, and no effect of family size on family migration, interpreting it as a specific feature of the frontier community.

There is a body of research that links the education of children and migration in modern times. Mincer, 'Family Migration' looks at the family ties relevant to migration decision-making and while he focuses on marital status and the role of wives, he also finds that the presence of school-aged children inhibits family migration. Long, 'The Influence of Number' analyzes the effect of the age of children as well as the number of children on family migration in the U.S. Similarly to our results, he finds a negative relationship between the probability of migrating and the number of children. His results also show that controlling for the household head age, families with children under age 6 are more mobile than families with children between the age 6 and 17. Long indicates that ties to a community and school makes families with school-aged children less mobile than families with children not attending school yet. The results do not exactly match ours, but it is not surprising given

[51] Ehmer and Zeitlhofer, 'Ländliche Migration'.

[52] Steckel, 'Household Migration and Rural'. Steckel used the household head age instead of the parents' ages. Therefore I re-ran my regressions with the household head age instead of parents' ages and the corresponding estimated coefficient was negative and highly statistically significant, supporting my claim that migration occurred at the beginning of the life-cycle.

[53] Another study by Steckel, 'Household Migration' also fails to find a significant effect of an additional child on family migration, although in this study he analyzed rural-rural migration.

[54] Galenson and Pope, 'Economic and Geographic'.

the different social and economic circumstances. However, Long's study points to the importance of the children's ages in explaining family migration and a possible link between the children's education and the propensity to migrate. In this regard, this study supports Long's assertions and at the same time suggests that the behavior of families migrating to Pilsen had similar features as modern families, which tie their migration decision-making to children's education. Future research is needed to further explore this issue.

Before moving to the conclusion, an alternative hypothesis to the one tested in this paper is worth addressing. The educational milestones analyzed in his paper also represent milestones in a mother's career. Indeed, having a child beginning primary education opens opportunities for the mother to pursue her own career. This might be the case especially in urban areas (Pilsen's labor market is an excellent example), where women could find employment not only in the domestic service industry, but also in the industrial sector such as the foodstuff, apparel, textile, or chemical industries. Unfortunately, our data do not allow testing of this hypothesis because of the under-representation of women's occupations in the manuscript returns.

## VII

This paper contributes to the literature on rural-urban migration with a micro-level analysis of the relationship between children's education and the probability of a family leaving the hinterlands for urban areas. Urban areas provide not only the prospect of higher wages, but also better educational opportunities. Therefore, relocation to a town opens the possibility not only to earn more than in rural areas, but also the possibility to acquire education and gain later with the skill premium. I argue that the prospect of education was among the motives for a family to migrate. Using 1900 population census data I show that the probability of migration is positively associated with the presence of a child at the age that maximizes educational attainment and the prospect of a child becoming an apprentice. The results thus suggest that the maximization of school time and acquiring practical skills is conducive to family migration. The results need to be interpreted carefully, though. I use cross section data which do not allow controlling for unobserved family characteristics. Furthermore, the

latter result does not lend itself to a causal, but rather correlative, interpretation. Nevertheless, they are at the very least suggestive that the education of children *can* be a migration motive.

The analysis in this paper is also another way of looking at the role of the expectations of future prospects in urban areas. It can be seen as a complement to the existing studies on the association between migration and intergenerational occupation mobility because the prospect of obtaining higher and better education in a town than in a village is usually connected with the prospect of occupational mobility.[55]

[55] Long, 'Rural-Urban Migration'.

## Appendix

While the migration decision of an individual is a straightforward calculation of the net expected present value of moving to a new place, the migration decision of a family is more complex, since the calculation has to be done for every family member. A useful way to formalize our thinking about family migration is to use a dynastic utility function combined with ideas derived from the analysis of job search.

Dynastic utility was originally developed to analyze family fertility decisions (Becker and Barro, 'A Reformulation'). It assumes that parents are altruistic toward their children and that parents' utility is a function of their own consumption, the number of their children, and the utility of their children. By its construction, dynastic utility makes it possible to account explicitly for the presence of children in the family and the interaction between children and parents. Therefore one can fully include children in the family migration decision where they do not anymore count only as "costs", but also as "benefits".

Formally, the family migration decision can be described as follows. A family is characterized by a dynastic utility function $U_t(c, n, u_{t+1})$ where $U_t$ is the utility of the whole family, $n$ is the number of children, $c$ is total consumption, and $u_{t+1}$ is the utility of children when they become adults. Subscript $t$ refers to the current generation which is the generation of the parents and $t+1$ refers to the next generation which is the generation of the children. The utility of the children depends on their own consumption.[56] The family maximizes the dynastic utility function with respect to consumption and the number of children, given the budget constraint where $c$ is total consumption, $p$ the costs of raising children, $n$ the number of children, and $E(I_f)$ the expected total family income which consists of the household head's expected income $E(I_{hh})$, the wife's expected income $E(I_w)$ and

[56] In the original paper by Becker and Barro, 'A Reformulation', the utility of children also depends on the utility of their own children; hence overall family utility depends on consumption and number of children in each generation. For simplicity, only a two-generation family is used here.

the children's expected income $E(I_{ch})$. The children's expected income depends on their level of human capital $h$ which is a function of the quality of the educational institutions.[57]

$$Max_{c,n} \sum_{t=1}^{2} \beta^t U_t(c, n, u_{t+1}) \qquad (1)$$

$$\begin{aligned} subject\ to: \quad & c^i + p^i * n = E(I^i{}_f) \\ & E(I^i{}_f) = E(I^i{}_{hh}) + E(I^i{}_w) + E(I^i{}_{ch}) \\ & E(I^i_{Ch}) = h(I^i) \\ & where\ \ i = A, B \end{aligned}$$

The family's choice is to move either to place A or place B. For place A, the family faces consumption costs $c^A$, costs of raising children $p^A$, the quality of school $s^A$ and job opportunities which would give them a total expected family income $E(I^A_f)$. For place B, the consumption costs are $c^B$, the costs of raising children are $p^B$, the quality of school $s^B$, and the total expected family income is $E(I^B_f)$. The family computes two value functions of its dynastic utility function: one when it lives in A and the other one when it lives in B. The family moves if the difference between those value functions exceeds migration costs.[58]

$$delta \equiv v(p^A, I^A_f, s^A) - v(p^B, I^B_f, s^B) > migration\ costs \qquad (2)$$

The higher the difference, the higher the probability of migration.

[57] The modeling of children's expected income follows Solon, 'A model'. The human capital of children can also depend on their natural human capital endowment inherited from their parents. For simplicity, only the quality of the educational institution is considered.

[58] For simplicity, migration costs are assumed to be exogenous. This can be relaxed as in Carrington et al., 'Migration with Endogenous', without altering the main results.

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*Figure 1 Age of the oldest child at migration*

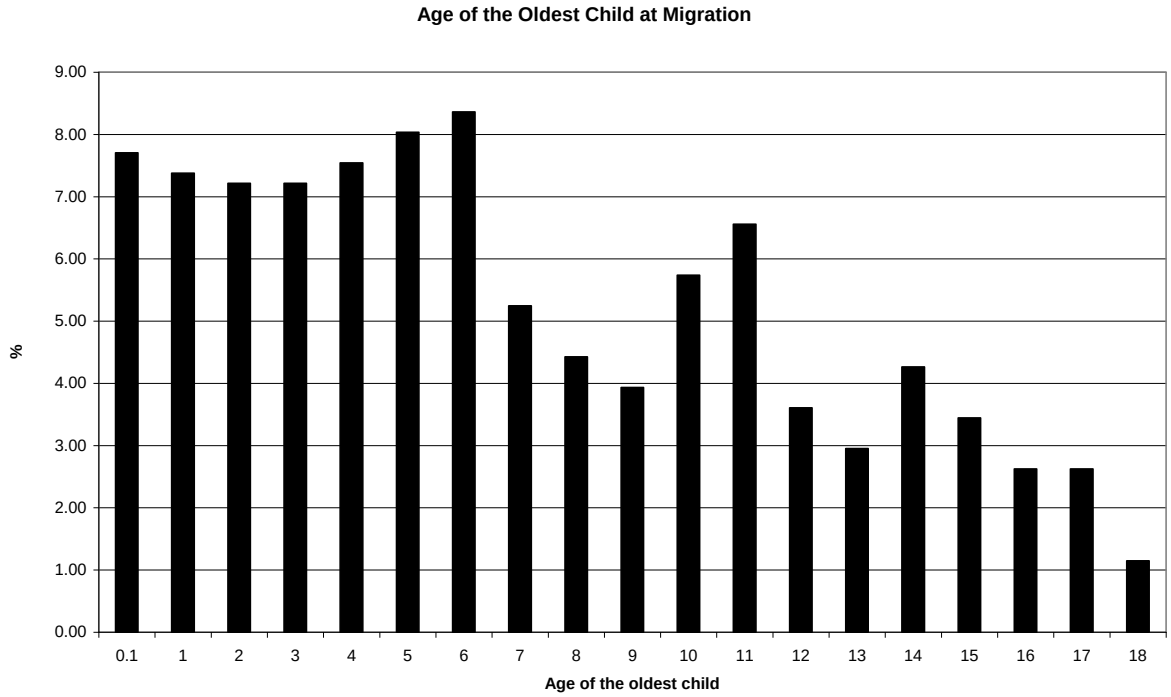

*Table 1. Family Nominal Daily Income in Pilsen in 1889 and Pilsen's Agricultural Hinterlands in 1893 (in Florins)*

| | Family unskilled nominal daily income | | |
|---|---|---|---|
| | Family I (only man works) | Family II (man and wife work) | Family III (man, wife and child work) |
| ***Pilsen*** | | | |
| Male wage | 0.8 | 0.8 | 0.8 |
| Female wage | | 0.3 | 0.3 |
| Child over 14 wage | | | 0.2 |
| Total family income | 0.8 | 1.1 | 1.3 |
| ***Agriculture hinterlands*** | | | |
| Male wage | 0.5 | 0.5 | 0.5 |
| Female wage | | 0.2 | 0.2 |
| Child over 14 wage | | | 0.17 |
| Total family income | 0.5 | 0.7 | 0.87 |

*Notes:* The male urban unskilled nominal daily wage was computed as the weighted average of nominal daily wages of male urban unskilled workers in mining, metal, machine-building, glass, stone, wood, paper, chemical, textile, food and construction industries; weights are the shares of male employment in the corresponding industries in 1889 calculated from Bericht (1893), page 245; the female urban unskilled nominal daily wage was computed as the weighted average of nominal daily wages of urban unskilled female workers in mining, stone, glass, wood, textile, food, paper and chemical industry; the weights are the shares of female employment in the corresponding industries in 1889 calculated from Bericht (1893), page 245. Details on the computation of the rural unskilled nominal daily wage are given in note [9]. Child nominal daily wage was calculated similarly as male unskilled nominal daily wage.
Computations by the author.
*Sources:* Urban unskilled nominal daily wage is calculated from Statistische Bericht (1893), pages 475–515. Rural unskilled nominal daily wage is calculated from Karl et al. 'Die landwirthschftlichen', Table 8, page 423; I assume 255 working days.

*Table 2. Family Nominal Daily Income in Pilsen and Pilsen's Non-Agricultural Hinterlands in 1898 (in Florins)*

| | Family unskilled nominal daily income | | |
|---|---|---|---|
| | Family I (only man works) | Family II (man and wife work) | Family III (man, wife and child work) |
| ***Pilsen*** | | | |
| Male wage | 1.2 | 1.2 | 1.2 |
| Female wage | | 0.4 | 0.4 |
| Child over 14 wage | | | 0.2 |
| Total family income | 1.2 | 1.6 | 1.8 |
| ***Nearby Districts*** | | | |
| Male wage | 0.8 | 0.8 | 0.8 |
| Female wage | | 0.3 | 0.3 |
| Child over 14 wage | | | 0.15 |
| Total family income | 0.8 | 1.1 | 1.25 |

*Note*: Computations by the author.
*Source*: Amtliche Nachrichten (1898).

*Table 3. Rural-Urban Family Income Gap Decomposition between Pilsen and Pilsen's Agricultural Hinterlands*

| | Family I (only man works) | Family II (man and wife work) | Family III (man, wife and child work) |
|---|---|---|---|
| Nominal income gap (%) | 60 | 57 | 49 |
| Adjusted for cost-of-living (%) | 36 | 33 | 25 |

*Note*: Computations by the author.
*Source*: Table 1. Costs-of-living adjustment is computed from Purš, 'Changes in the Standard', Table 12, page 206.

*Table 4. Rural-Urban Family Income Gap Decomposition between Pilsen and Pilsen's Non-Agricultural Hinterlands*

| | Family I (only man works) | Family II (man and wife work) | Family III (man, wife and child work) |
|---|---|---|---|
| Nominal income gap (%) | 50 | 45 | 44 |
| Adjusted for cost-of-living (%) | 26 | 21 | 20 |

*Note*: Computations by the author.
*Source*: Table 2. Costs-of-living adjustment is computed from Purš, 'Changes in the Standard', Table 12, page 206.

*Table 5. Family Characteristics of Migrants and Stayers: Migrants characteristics are in the first row, stayers' in the second. Migrants' characteristics are evaluated at the time of arrival to Pilsen*

| | Min | Max | Standard Deviation | Average |
|---|---|---|---|---|
| Age of HH male | 19<br>18 | 76<br>85 | 12.1<br>9.6 | 31.5<br>45.5 |
| Age of HH female age | 22<br>30 | 66<br>75 | 12.2<br>11.1 | 43.8<br>54.4 |
| Age of wife | 20<br>18 | 80<br>70 | 9.9<br>11.2 | 33.7<br>45.2 |
| Age of children younger than 18 | 0<br>0 | 18<br>18 | 4.6<br>5.1 | 6.8<br>9.0 |
| Age of son younger than 18 | 0<br>0 | 18<br>18 | 4.6<br>5.0 | 6.9<br>9.2 |
| Age of daughter younger than 18 | 0<br>0 | 18<br>18 | 4.6<br>5.2 | 6.7<br>8.9 |
| Number of children younger than 18 | 0<br>0 | 5<br>9 | 1.9<br>2.3 | 2.1<br>3.7 |

*Note*: Family characteristics of migrants are evaluated at the year of arrival. Computations by the author.
*Source*: Manuscript returns of the 1900 decennial census of the Habsburg monarchy.

*Table 6. Family Characteristics of Migrants and Stayers: Occupation Structure (%)*
*Migrants' characteristics are in the first row, stayers' in the second.*

| | Male HH | Female HH | Wife | Male Offspring | Female Offspring |
|---|---|---|---|---|---|
| Skilled Labor | 45.15 | 58.62 | 0.51 | 6.05 | 1.31 |
| | 21.1 | 0.00 | 0.45 | 1.26 | 0.22 |
| Unskilled Labor | 32.91 | 3.45 | 0.25 | 8.16 | 5.77 |
| | 13.19 | 23.53 | 2.24 | 5.76 | 4.36 |
| Day Laborer | 18.62 | 13.79 | 1.9 | 10.79 | 8.14 |
| | 6.37 | 0.00 | 15.02 | 16.01 | 19.39 |
| Agriculture | 0.00 | 0.00 | 0.00 | | |
| | 48.13 | 29.41 | 0.00 | | |
| Apprentice | | | | 24.11 | 6.04 |
| | | | | 10.61 | 2.18 |
| Primary School | | | | 43.68 | 40.42 |
| | | | | 40.29 | 39.65 |
| Secondary School | | | | 8.16 | 1.57 |
| | | | | 1.62 | 0.00 |
| Unspecified | 3.32 | 24.14 | 97.34 | 1.05 | 36.75 |
| | 11.21 | 47.06 | 82.29 | 24.46 | 34.2 |
| Total | 100 | 100 | 100 | 100 | 100 |
| | 100 | 100 | 100 | 100 | 100 |

*Note*: Computations by the author.
*Source*: Manuscript returns of the 1900 decennial census of the Habsburg monarchy

*Table 7. Probit Analysis: Determinants of Family Rural-Urban Migration with Age-Specific Variables*

| | I | | II | | III | | IV | | V | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects |
| **Parents** | | | | | | | | | | |
| Average age of parents | -0.045 [c] | -0.02 | -0.03 | -0.01 | -0.046 [c] | -0.02 | -0.04 [c] | -0.02 | -0.04 [c] | -0.018 |
| | (0.003) | | (0.04) | | (0.004) | | (0.004) | | (0.004) | |
| (Average age of parents)^2 | 0.00004 [c] | 0.00002 | -0.0003 | 0.00005 | 0.00004 [c] | 0.00002 | 0.00004 [c] | 0.00002 | 0.00008 [c] | 0.0001 |
| | (3.91e-06) | | (0.0006) | | (4.83e-06) | | (4.58e-06) | | (4.7 e-06) | |
| Unskilled | 0.7 [c] | 0.2 | 0.8 [b] | 0.2 | 0.7 [c] | 0.24 | 0.7 [b] | 0.25 | 0.66 [b] | 0.24 |
| | (0.19) | | (0.34) | | (0.3) | | (0.3) | | (0.08) | |
| **Children** | | | | | | | | | | |
| Number of children | -0.1 [b] | -0.07 | | | -0.15 [c] | -0.06 | -0.15 [c] | -0.06 | -0.13 [c] | -0.05 |
| | (0.07) | | | | (0.03) | | (0.02) | | (0.04) | |
| Presence of a child younger than 6 | | | | | 0.08 | 0.03 | 0.05 | 0.02 | 0.06 | 0.02 |
| | | | | | (0.1) | | (0.04) | | (0.1) | |
| Presence of a 6 year old child | | | 0.5 [a] | 0.3 | 0.05 [a] | 0.03 | | | 0.046 [a] | 0.018 |
| | | | (0.3) | | (0.03) | | | | (0.03) | |
| Presence of a child between 7 and 9 | | | | | -0.07 [b] | -0.027 | | | -0.06 [b] | -0.024 |
| | | | | | (0.03) | | | | (0.03) | |
| Presence of a 10 year old child | | | | | 0.05 | 0.015 | | | 0.03 | 0.01 |
| | | | | | (0.04) | | | | (0.03) | |
| Presence of a 11 year old child | | | | | 0.04 [a] | 0.014 | | | | |
| | | | | | (0.02) | | | | | |
| Presence of a 13 year old child | | | | | 0.04 | 0.013 | | | | |
| | | | | | (0.03) | | | | | |
| Presence of a child older than 14 | | | | | 0.06 [c] | 0.02 | | | | |
| | | | | | (0.02) | | | | | |
| Presence of school-aged children | 0.02 | 0.006 | | | | | | | | |
| | (0.04) | | | | | | | | | |
| Presence of the oldest child of the age 6 | | | | | | | 0.07 [a] | 0.03 | | |
| | | | | | | | (0.04) | | | |
| Presence of the oldest child of the age 11 | | | | | | | | | 0.06 [b] | 0.025 |
| | | | | | | | | | (0.03) | |

*Table 7: Continue*

| | I Coefficient (std.err.) | Marginal Effects | II Coefficient (std.err.) | Marginal Effects | III Coefficient (std.err.) | Marginal Effects | IV Coefficient (std.err.) | Marginal Effects | V Coefficient (std.err.) | Marginal Effects |
|---|---|---|---|---|---|---|---|---|---|---|
| *County of Origin Dummies* | YES | | YES | | YES | | YES | | YES | |
| *Constant* | YES | | YES | | YES | | YES | | YES | |
| N | 1266 | | 274 | | 1266 | | 1266 | | 1266 | |
| Pseudo R^2 | 0.2 | | 0.22 | | 0.22 | | 0.21 | | 0.21 | |
| Log Likelihood | -711.2 | | -138.2 | | -680.42 | | -703.1 | | -682.2 | |
| Prob | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | | 0.0000 | |
| P[Migrant=1¦X=E(X)] | 0.56 | | 0.56 | | 0.56 | | 0.56 | | 0.56 | |

| Tests of the differences between the child-age estimates: | Test Statistics chi-square (1): |
|---|---|
| Oldest child at the age 6 vs. child younger than 6 | 0.84 |
| Oldest child at the age 11 vs. child younger than 6 | 0.95 |
| Child at the age 6 vs. child younger than 6 | 1.64 |
| Child at the age 6 vs. child between the age 7 and 9 | 10.15** |
| Child between the age 7 and 9 vs. child at the age 10 | 7.48* |
| Child at the age between 7 and 9 vs. child at the age 11 | 7.16* |
| Child at the age 10 vs. child at the age 11 | 0.04 |
| Child at the age 11 vs. child younger than 6 | 0.70 |

*Notes:* [a] = Significance at 10% level, [b] = Significance at 5% level, [c] = Significance at 1% level.
The dependent variable is a 1/0 variable indicating a migrant/stayer family. Migrants are considered at the time of arrival to Pilsen. Occupation categories of parents refer to the occupation of the household head. Estimation was done by the Maximum Likelihood method; estimator of the variance accounted for the possibility of correlation of errors within the political districts. Omitted dummies are: Parents' occupation: Skilled, Children's occupation: Unspecified, Regional Dummies: North Bohemia
*Source*: Manuscript returns of the 1900 decennial population census of the Habsburg monarchy.

*Table 8. Probit Analysis: Determinants of Family Rural-Urban Migration with Age-Specific Variables, Sensitivity Analysis*

| | I Coefficient (std.err.) | Marginal Effects | II Coefficient (std.err.) | Marginal Effects | III Coefficient (std.err.) | Marginal Effects |
|---|---|---|---|---|---|---|
| **Parents** | | | | | | |
| Average age of parents | -0.046 [c] | -0.02 | -0.04 [c] | -0.02 | -0.04 [c] | -0.02 |
| | (0.004) | | (0.004) | | (0.004) | |
| (Average age of parents)^2 | 0.00004 [c] | 0.00002 | 0.00004 [c] | 0.00002 | 0.00008 [c] | 0.0001 |
| | (8.62e-06) | | (8.25e-06) | | (4.7 e-06) | |
| Unskilled | 0.66 [c] | 0.24 | 0.6 [b] | 0.25 | 0.66 [b] | 0.24 |
| | (0.08) | | (0.08) | | (0.08) | |
| **Children** | | | | | | |
| Number of children | -0.16 [c] | -0.06 | -0.15 [c] | -0.06 | -0.13 [c] | -0.06 |
| | (0.05) | | (0.03) | | (0.04) | |
| Presence of a child younger than 5 | 0.076 | 0.03 | 0.02 | 0.026 | 0.06 | 0.024 |
| | (0.1) | | (0.15) | | (0.1) | |
| Presence of a 5 or 6 year old child | 0.05 [a] | 0.02 | | | 0.05 [a] | 0.02 |
| | (0.03) | | | | (0.03) | |
| Presence of a child between 7 and 9 | -0.07 [b] | -0.03 | | | -0.06 [b] | -0.025 |
| | (0.03) | | | | (0.03) | |
| Presence of a 10 year old child | 0.04 | 0.015 | | | 0.03 | 0.01 |
| | (0.03) | | | | (0.03) | |
| Presence of a 11 year old child | 0.03 [a] | 0.01 | | | | |
| | (0.015) | | | | | |
| Presence of a 13 year old child | 0.033 | 0.013 | | | | |
| | (0.03) | | | | | |
| Presence of a child older than 14 | 0.06 [c] | 0.02 | | | | |
| | (0.028) | | | | | |
| Presence of the oldest child of the age 5 or 6 | | | 0.056 [a] | 0.02 | | |
| | | | (0.03) | | | |
| Presence of the oldest child of the age 11 | | | | | 0.07 [b] | 0.03 |
| | | | | | (0.03) | |
| *County of Origin Dummies* | YES | | YES | | YES | |
| *Constant* | YES | | YES | | YES | |
| N | 1266 | | 1266 | | 1266 | |
| Pseudo R^2 | 0.21 | | 0.20 | | 0.21 | |
| Log Likelihood | -680.19 | | -688.5 | | -681.4 | |
| Prob | 0.0000 | | 0.0000 | | 0.0000 | |
| P[Migrant=1¦X=E(X)] | 0.56 | | 0.56 | | 0.56 | |

| Tests of the differences between the child-age estimates: | Test Statistics chi-square (1): |
|---|---|
| Oldest child at the age 5 or 6 vs. child younger than 5 | 0.04 |
| Oldest child at the age 11 vs. child younger than 5 | 0.03 |
| Child at the age 5 or 6 vs. child younger than 5 | 0.01 |
| Child at the age 5 or 6 vs. child between the age 7 and 9 | 8.02** |
| Child between the age 7 and 9 vs. child at the age 10 | 7.45*** |
| Child at the age between 7 and 9 vs. child at the age 11 | 6.03** |
| Child at the age 10 vs. child at the age 11 | 0.02 |
| Child at the age 11 vs. child younger than 5 | 0.12 |

*Notes:* [a] = Significance at 10% level, [b] = Significance at 5% level, [c] = Significance at 1% level.
The dependent variable is a 1/0 variable indicating a migrant/stayer family. Migrants are considered at the time of arrival to Pilsen. Occupation categories of parents refer to the occupation of the household head. Estimation was done by the Maximum Likelihood method; estimator of the variance accounted for the possibility of correlation of errors within the political districts. Omitted dummies are: Parents' occupation: Skilled, Children's occupation: Unspecified, Regional Dummies: North Bohemia
*Source*: Manuscript returns of the 1900 decennial population census of the Habsburg monarchy.

*Table 9. Probit Analysis: Determinants of Family Rural-Urban Migration with Age-Specific Gender Variables*

| | I | | II | | III | |
|---|---|---|---|---|---|---|
| | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects | Coefficient (std.err.) | Marginal Effects |
| ***Parents*** | | | | | | |
| Average age of parents | -0.04 [c] (0.003) | -0.02 | -0.04 [c] (0.003) | -0.02 | -0.04 [c] (0.004) | -0.016 |
| (Average age of parents)^2 | 0.00004 [c] (3.74e-06) | 0.00002 | 0.00004 [c] (3.78e-06) | 0.00002 | 0.00004 [c] (3.05e-06) | 0.00001 |
| Unskilled | 0.65 [b] (0.31) | 0.24 | 0.66 [b] (0.3) | 0.24 | 0.66 [b] (0.31) | 0.24 |
| ***Children*** | | | | | | |
| Number of children | -0.23 [b] (0.04) | -0.09 | -0.15 [c] (0.03) | -0.06 | -0.16 [c] (0.02) | -0.06 |
| Presence of a child younger than 6 | | | | | 0.04 (0.04) | 0.016 |
| Presence of a 6 year old child | | | | | 0.04 [a] (0.02) | 0.015 |
| Presence of a daughter | 0.12 [b] (0.05) | 0.04 | | | | |
| Presence of a school-girl | | | 0.05 [b] (0.02) | 0.02 | | |
| Presence of a daughter as the oldest child of the age 11 | | | | | 0.1 [b] (0.06) | 0.05 |
| *County of Origin Dummies* | YES | | YES | | YES | |
| *Constant* | YES | | YES | | YES | |
| N | 1266 | | 1266 | | 1266 | |
| Pseudo R^2 | 0.21 | | 0.21 | | 0.21 | |
| Log Likelihood | -702.2 | | -703.7 | | -701.2 | |
| Prob | 0.0000 | | 0.0000 | | 0.000 | |
| P[Migrant=1¦X=E(X)] | 0.56 | | 0.56 | | 0.56 | |

Notes: [a] = Significance at 10% level, [b] = Significance at 5% level, [c] = Significance at 1% level.
The dependent variable is a 1/0 variable indicating a migrant/stayer family. Migrants are considered at the time of arrival to Pilsen. Occupation categories pf parents refer to the occupation of the household head. Estimation was done by the Maximum Likelihood method; estimator of the variance accounted for the possibility of correlation of errors within the political districts. Omitted dummies are: Parents' occupation: Skilled, Children's occupation: Unspecified, Regional Dummies: North Bohemia
Source: Manuscript returns of the 1900 decennial population census of the Habsburg monarchy.

*Table 10. Probit Analysis: Determinants of Family Rural-Urban Migration with Child Occupation Variables*

| | I Coefficient (std.err.) | Marginal Effects | II Coefficient (std.err.) | Marginal Effects | III Coefficient (std.err.) | Marginal Effects |
|---|---|---|---|---|---|---|
| *Parents* | | | | | | |
| Average age of parents | -0.05 [c] (0.006) | -0.02 | -0.05 [c] (0.005) | -0.02 | -0.048 [c] (0.005) | -0.02 |
| (Average age of parents)^2 | 0.00005 [c] (6.97e-06) | 0.00002 | 0.000049 [c] (6.2e-06) | 0.00002 | 0.000048 [c] (6.18e-06) | 0.00002 |
| Unskilled | | | | | 0.66 [b] (0.3) | 0.2 |
| *Children* | | | | | | |
| Number of children | | | -0.12 [c] (0.03) | -0.05 | -0.12 [c] (0.03) | -0.05 |
| Presence of a boy older than 14 working | -0.08 (0.2) | -0.03 | 0.11 (0.2) | 0.04 | 0.21 (0.2) | 0.08 |
| Presence of a girl older than 14 working | -0.14 (0.3) | -0.05 | 0.07 (0.4) | 0.03 | 0.07 (0.4) | 0.03 |
| Presence of a boy older than 14 at school | -0.5 (0.2) | -0.19 | -0.3 (0.2) | -0.13 | -0.4 (0.2) | -0.16 |
| Presence of a girl older than 14 at school | 0.3 (0.3) | 0.12 | 0.5 (0.4) | 0.19 | 0.6 (0.4) | 0.22 |
| Presence of a boy older than 14 at apprenticeship | 0.97 [c] (0.2) | 0.42 | 0.98 [c] (0.2) | 0.4 | 0.9 [c] (0.2) | 0.36 |
| Presence of a girl older than 14 at apprenticeship | 0.4 (0.3) | 0.17 | 0.5 (0.3) | 0.19 | 0.5 (0.3) | 0.18 |
| *County of Origin Dummies* | YES | | YES | | YES | |
| *Constant* | YES | | YES | | YES | |
| N | 1266 | | 1266 | | 1266 | |
| Pseudo R^2 | 0.16 | | 0.18 | | 0.21 | |
| Log Likelihood | -729.8 | | -713.1 | | -682.5 | |
| Prob | 0.000 | | 0.000 | | 0.000 | |
| P[Migrant=1¦X=E(X)] | 0.56 | | 0.56 | | 0.56 | |

Notes: [a] = Significance at 10% level, [b] = Significance at 5% level, [c] = Significance at 1% level.
The dependent variable is a 1/0 variable indicating a migrant/stayer family. Migrants are considered at the time of arrival to Pilsen. Occupation categories of parents refer to the occupation of the household head. Estimation was done by the Maximum Likelihood method; estimator of the variance accounted for the possibility of correlation of errors within the political districts. Omitted dummies are: Parents' occupation: Skilled, Children's occupation: Unspecified, Regional Dummies: North Bohemia
Source: Manuscript returns of the 1900 decennial population census of the Habsburg monarchy.