All in the Family: Rural-Urban Migration in Bohemia at the End of the Nineteenth Century

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Abstract

This paper analyzes the rural-urban migration of families in the Bohemian region of Pilsen in 1890–1900. Using a new 2000-family dataset from the 1900 population census I examine the human capital investment aspect of rural-urban migration. I find that families migrated to the city such that the educational attainment of their children would be maximized and adolescent children are systematically more present as apprentices than unskilled workers. The results strongly suggest that in addition to labor reallocation, rural-urban migration is also a mechanism of human capital investment.

Introduction

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. Cities, however, provide more than higher wages. Cities also provide a better quality of education.[1] 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 as well? This paper tackles this question by analyzing rural-urban migration by entire *families*. It shows that families moved to a city *not only* to take advantage of the real urban wage premium but *also* to invest into human capital.

Why is it important to look at the human capital investment aspect of rural-urban migration? Human capital investment is a crucial part of successful development and economic growth as shown by modern economic growth research. Rural-urban migration, on the other hand, is a key mechanism of development, shifting labor from agriculture to industries and services, and its failure has a negative impact on economic growth. Therefore, studying whether rural-urban migration was also a mechanism of human capital investment would not only add to our knowledge of migration determinants but it would also add to our understanding of economic development and expand our knowledge about the determinants of a successfully developing country.[2] Current research on historical migration focused on various issues related to the determinants of migration as well as the effects of migration on the growing urban sector.[3] The

[1] For a formal consideration of the connection between cities and education, see for example Glasear, "Learning".

[2] Current research on economic development and growth has recognized the importance of the human capital aspect of rural-urban migration in economic development; see for example Lucas, "Life Earnings".

[3]See for example Baines, "Migration"; Boyer, "Labour Migration"; Boyer et al., "Migration"; Grant, "Migration"; Galenson et al., "Economic and Geographic Mobility"; Long, "Rural-Urban Migration";

human capital investment aspect of historical rural-urban migration, however, has not been explored yet.[4]

Family migration offers a genuine opportunity to investigate this issue. 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 parents' higher wages or employment in industrial sector, 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.

The following analysis is based on the investigation of the migrant *family structure* and the occupation of children on arrival to a city for patterns indicating parental concern about children's education as a motive for migration. Theoretically, it stems from a dynastic utility framework, empirically it uses a probit regression framework and a unique data set of nearly 2000 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. This region provides an excellent laboratory for exploring the determinants of migration for several reasons. First, the Czech Lands had the most dynamic economy of Central Europe in the period, famous for its early and rapid industrialization and enjoying a GDP per capita very close to the more developed regions of Germany.[5] Within Bohemia, the city of Pilsen saw the fastest economic growth at the end of the nineteenth century, accompanied by a

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Silvestre, "Internal Migration"; Steckel, "Household Migration and Rural Development"; Williamson, "Coping with City".

[4] The issue of human capital and rural-urban migration has been addressed by Jeffrey Williamson; however, he focused on the human capital transfer involved in a young rural population moving to a city, causing the city to invest less in rearing children, rather than the human capital investment of migrants after they relocated to a city.

[5] See Good, "The Economic Lag", Table 6, page 886.

massive inflow of migrants from rural areas. This provides us with a large population of migrants trying to take advantage of a rapidly growing urban center. Furthermore, Pilsen had the most developed educational facilities of any place in Bohemia, enabling everyone to attain a high quality of education.[6] These features make it possible to investigate whether migration was really only about the rural-urban wage gap or also about human capital accumulation.

The results of the study show that the age composition of migrant children on the arrival to Pilsen is such that their educational attainment was maximized. Also, the adolescent children of migrants were systematically more likely to be apprentices than unskilled workers. This strongly suggests that parents moved to the city also to invest into the human capital of their children; hence rural-urban migration was *not only* about the urban wage premium but *also* about human capital investment.

This paper thus makes several unique contributions to the important debate about rural-urban migration and human capital investment during industrialization in developing economies. First, it explores the neglected human capital investment aspect of rural-urban migration by analyzing the influence of parents' aspirations concerning their children's educational attainment on family migration decisions. It is also the first analysis of historical migration decisions explicitly to explore the role of children in family migration decision-making. Then, it is the first migration study to base itself theoretically on a dynastic utility approach. It makes use of a unique dataset—the Habsburg monarchy population census—which has never been explored before. Last but not least, it is the very first study on migration in nineteenth-century Bohemia, one of the fastest-growing and most successful industrializing economies in nineteenth-century Europe, but one hitherto almost completely overlooked by economic historians.[7]

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

[6] See, for example, "Popis Školního Okresu Plzeňského [The Description of the Pilsen School District]".

[7] The only exception is the research on early modern Bohemia by Sheilagh Ogilvie. See for example Ogilvie, "The Economic World", "Communities", and Ogilvie et al., "Women".

section discusses the unique dataset collected for the analysis. The fifth section presents the regression analysis with the discussion and the implications of the results. The last section presents the conclusions.

Family migration – a theoretical exposé

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 complicated, 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.[8] It assumes that parents are altruistic toward their children and that parents' utility depends on 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. The implication for family migration is that it is possible to fully include children in the family migration decision; they do not anymore count only as "costs", but also as "benefits".[9]

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

[8] See Becker and Barro, "A Reformulation".

[9] This is in contrast with migration studies that view children as a hindrance to migration; an exception is Zhao, "Leaving the Countryside".

the children depends on their own consumption.[10] 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 the children's expected income $E(I_{ch})$.

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

$$subject\ to: \quad c^i + p^i * n = E(I^i{}_f)$$
$$E(I^i{}_f) = E(I^i{}_{hh}) + E(I_{\ w}) + E(I_{\ ch}) \qquad (3)$$
$$where\ \ i = A, B$$

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, 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, 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.[11]

$$delta \equiv v(p^A, I^A_f) - v(p^B, I^B_f) > migration\ costs \qquad (4)$$

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

[10] 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.

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

What are the implications of this logic for investigating family rural-urban migration, and how can it be operationalized in a quantitative analysis? Apart from the obvious considerations of the expected real rural and urban income of parents, children's expected rural and urban income now becomes crucial in the migration decision. While the parents' expected income is not difficult to incorporate into the quantitative analysis as we know their occupations, the children's expected income is more challenging. I solve this problem by analyzing the *family structure* of migrants to see if it reflects concerns about children's education. Children's education is important because by migrating to a town children can benefit from better education enabling them to achieve upward economic mobility and escape their parents' occupational trajectory.[12] The family structure indicator of particular importance is the presence of offspring in the age group when children usually start education in that society. By migrating to a town when children usually start education, parents maximize their high quality educational attainment since the urban areas provide both higher quality of education and more secondary education opportunities.[13] Since educational attainment directly affects future income, parents thus maximize children's expected income.[14]

[12] Another benefit for children would be to work in a growing industrial sector instead of going to school since the industrial sector provides higher wages than the agricultural sector. This, however, might not be optimal in the long run since without education children would end up as unskilled workers, losing the skilled premium. On the other hand, the higher costs of raising children in a town relative to the hinterlands might force parents to substitute children's education for their labor. Therefore, in the next section we are going to consider whether the situation in Pilsen called for child's labor or whether it allowed the parents to send their children to schools.

[13] The argument behind higher quality of education in urban rather than in rural areas is based on the observation that rural areas have usually lower teacher/pupil ratio, which negatively affects the quality of education.

[14] There is a voluminous literature on the effect of educational attainment and school quality on future earnings. For a useful summary of recent findings see Moffitt, "Symposium."

The migration decision is then analyzed using a probit regression with a dichotomous dependent variable indicating whether the family migrates or stays put, and separate explanatory variables for parents and children. Parents are characterized according to occupation and age, children by their aggregate number, occupation, presence of school-aged children, and presence of children at the age of starting compulsory primary education. What would be the expected effects? The age of parents should be negatively related to migration because of the logic of the life-cycle. The effect of parent's occupation will depend on the rural-urban wage gap for skilled and unskilled workers. Usually, there is substantial gap between the wages of unskilled agricultural laborers and those of unskilled urban workers, so we would expect a positive effect.[15] The same applies for skilled workers. As for the number of children, the effect will depend on the costs of raising children, children's labor productivity in rural and urban sectors, and the trade-off between child quantity and child quality.[16] The costs of raising children are usually higher in towns than in villages, so *ceteris paribus* a large number of children should hinder migration. But if children's labor productivity in the town is high enough to offset the higher costs of child-raising, then more children should not be an obstacle to migration. On the other hand, the quality-quantity trade-off would lead us to expect higher child numbers to have a negative impact on the propensity of a family to migrate. The overall effect would then depend on the concrete circumstances.[17] The presence of children of a certain age captures the effect of the family's concern about children's future prospects. If child labor is important for migration, the migration decision will be affected by the presence of children at the age when children become net producers, which is usually around 10–12 years. If the real wage of children is higher in rural

[15] See for example Williamson, "Coping with City".

[16] Another factor could be the costs of physical reallocation. These costs are not considered here as they are relevant for the long-distance/transatlantic migration while the paper deals with short-distance migration.

[17] Research on migration in developed countries usually reports a negative effect of the number of children on migration, see for example Long, "The Influence". However, some economic history research has failed to find a significant effect, for example Galenson et al., "Economic and Geographic Mobility", page 645 and Steckel, "Household Migration and Rural Settlement", page 199.

than urban areas, then the presence of children of productive age would be a hindrance to migration. If it is investment in children's human capital that is important for migration, the migration decision will be affected by the presence of children at the age when education matters, which is usually in the age group between 6 and 14 years. Since education is usually better in towns than in villages, the presence of children of this age should be conducive to migration. Again, which of the forces—child labor or education—prevails would depend on the situation on the labor market and in the education sector.

In order to analyze the impact of children on family migration decisions, therefore, we must have information on both labor markets and education in rural and urban areas. The next section thus focuses on Pilsen and its rural hinterland—its economic position within Bohemia, the opportunities the city offered to rural migrants, rural-urban gaps in real family income, and the future prospects of children in villages compared to the town.

Pilsen

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 the population of Pilsen was working in industry and 25 percent in trade. The Pilsen region had become one of the most developed regional

economies not only of Bohemia but of the whole Habsburg monarchy.[18] The industrialization of Pilsen had the form of flexible specialization rather than mass production.[19]

The industrialization of Pilsen was accompanied by a substantial increase in its population, which toward the end of the nineteenth century was driven predominantly by a huge migration from the nearby villages.[20] The city of Pilsen was not prepared to cope with such intensive migration. The housing market responded sluggishly and the price of apartments in Pilsen increased.[21] As a consequence, the migrants settled not just in the city of Pilsen itself but also in the suburban villages, a development that intensified in the last decade of the nineteenth century. Table 1 shows the population development of Pilsen and its suburban villages. We see more than a 100 percent increase in the suburban population of Pilsen in the final decade of the nineteenth century, confirming the huge inflow of migrants.

INSERT TABLE 1 HERE

Pilsen's hinterland consisted of a mixture of farms and small firms working in the metal and food industry. Despite the presence of industries, only 3 percent of the population of the Pilsen hinterland found employment in those firms, with the remainder still working in agriculture.[22] Pilsen's hinterland consisted of low-yield agricultural soils with the lowest average wage of any region of Bohemia. Nevertheless, the situation was not gloomy. In an agricultural

[18] Chylík, "Hospodářský rozvoj [Economic Development]".

[19] 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 a mass production.

[20] Within the years 1890–1900, the population increased by 35%, out of which 15% was a natural increase and 20% was due to migration, see Daneš "Obyvatelstvo [The Population]".

[21] Jíša, "Škodovy závody [Skoda Works]".

[22] Bělohlávek, "Plzeňské vesnice [Pilsen's Villages]", page 125.

survey conducted in the 1890s to assess living conditions in Bohemian rural areas, Pilsen's hinterland was characterized as providing sufficient resources for a respectable life.[23]

Overall, in the last two decades of the nineteenth century, Pilsen acted as a very strong attractor, pulling people out of rural areas. No one could doubt that the main reason was an expanding industrial sector which provided ample opportunities to earn higher real wages. But was the rural-urban real wage gap the only reason for families 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. To examine the first, we need to know more about family income and child labor. The second channel can be examined by looking at family structure and educational facilities. We will first examine family income, child labor, and educational facilities before moving, in the next section, to family structure and children's human capital investments.

To examine family income, ideally one would like to have disaggregated, accurate information (as in Sara Horrell and Jane Humphries, 1994). 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 wages for men, women and children by occupation and industry. The statistical office of the Habsburg monarchy also collected fairly accurate information on nominal agricultural wages. 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.

[23] Výsledky šetření [The Results of the Survey].

INSERT TABLE 2 HERE

What were the employment opportunities for men 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. Table 2 shows the average nominal wage of unskilled men in Pilsen in 1889 and the nominal wage of agricultural laborers in 1893.[24] It is apparent that an unskilled worker could have earned 100 percent more (in nominal terms) in Pilsen than in the hinterland.[25] To make the numbers real, the cost-of-living ratio was applied and the disamenity premium was accounted for.[26] We have information on the living expenses of an adult person

[24] The calculation of the average nominal wage in Pilsen is described in detail in the notes to Table 2. The calculation of the average nominal wage in agriculture needs more detailed explanation. I use the nominal wages of agricultural laborers as reported in the "Agricultural Census" for the Habsburg monarchy in the early 1890s, which appeared to provide the most reliable data. The nominal male and female agricultural wage for the Pilsen region is computed as the average of nominal wages (by sex) in 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 wage does not include payments in kind; therefore we should consider it as a lower bound.

[25] This gap may seem very high, but it is explained by the fact that Pilsen's hinterland had one of the lowest agricultural wages in the country whereas the town of Pilsen was the fastest growing urban center in Bohemia.

[26] Historians often mention the unhealthy living conditions in Pilsen compared to its rural hinterland, which suggests that higher nominal urban wages might have included a disamenity premium. See for example Jíša, "Škoda", pages 144–145.

living in industrial centers and rural areas in Bohemia in 1879.[27] Since it is reasonable to assume that the ratio did not change dramatically until the end of the nineteenth century, I use it to adjust the nominal rural-urban wage gap. Table 2 shows that even after this adjustment, there was still an urban premium of 81 percent for men. To account for the disamenity premium I used Williamson's figures since no such figures are available for either Bohemia or any other part of the Habsburg monarchy.[28] Even accounting for possible urban disamenities, the urban premium for male workers was greater than 61 percent.

Women's earnings must not be neglected, as they represented an important part of the family's income.[29] The main industry was textiles, where women accounted for more than 60 percent of total employment. The second most important industry was food, followed by chemicals. Table 2 shows the average female nominal daily wage in Pilsen and its rural hinterland, together with a decomposition of the nominal rural-urban wage gap for females. Women earned 63 percent less than men in Pilsen and 60 percent less than men in the hinterland. The nominal rural-urban wage gap for women was 47 percent, which drops to 21 percent after the cost-of-living and disamenity premium adjustments.

To complete the computation of family income calculating the wages of children is needed. Child labor constituted an important part of the labor force during industrialization and

[27] See Purš, "Changes". Living expenses included costs of food, clothing, rent, heat, light, and health insurance. I added health insurance to the living expenses in the rural areas on the assumption that they equaled those in urban areas.

[28] Williamson, "Coping with City", page 250. I use the upper bound of the disamenity premium, which is 7%. Using Williamson's disamenity premium is not without problems as one may argue about the reliability of this estimate as well as its use in the Bohemian context. The main results, however, would hold even without it. The reason I used the disamenity premium is that the unhealthiness of rapidly growing cities during industrialization was a problem that should be, even with a questionable estimate, included in the cost-of-living adjustment.

[29] See Horrell et al., "Women's Labor Force".

its contribution to family income was very significant.[30] In the second half of the nineteenth century, however, child labor started to decline due to technological advances and child labor legislation.[31] Nevertheless, even at the end of the nineteenth century, child labor was non-trivial and families often relied on children's income.[32] In the Habsburg monarchy, child labor started being restricted by legislation in the 1860s[33]. Two laws limiting child labor were promulgated: the school law and the child labor law.[34] The school law passed in 1869 made school attendance compulsory between the ages of 6 and 14. This severely restricted the (legal) employment of children.[35] However, this law did allow senior pupils to have a shorter school term due to spring work in the fields. In 1881, a new school law was passed. It confirmed restrictions on child labor in factories, but it explicitly allowed a two-year shorter compulsory education for children in very poor families and children in the hinterland. This meant that in the rural areas, children could finish compulsory primary education at age 12. After the school laws, an important child labor law was passed in 1885. The law forbade child labor in factories before age 14 and in small family firms before age 12. Farms could employ children above age 12. The law was strictly enforced since inspectors regularly visited factories and imposed fines for illegal child employment.

What were the consequences of these laws? First, they clearly favored child labor in agriculture as opposed to industry. Second, they contributed to a decrease child labor in the industrial sector. Knowledge of how profound the decline was must await future research, but current historiography compellingly argues that child labor declined substantially in this period.[36]

[30] Horrel et al., "Women's Labor Force".

[31] Nardellini, "Child Labor".

[32] Parsons et al., "Parental Altruism".

[33] The following paragraphs are based on Houser, "Dětská práce [Child Labor]".

[34] Child labor laws were part of the laws regulating factories and small firms.

[35] According to the law, a factory owner who employed children at that age had to make sure that they regularly attended school.

[36] See Papathanassiou, "Zwischen Arbeit".

The situation in Pilsen indicates that these laws were strictly enforced. Table 3 shows the number of children employed in Pilsen's industrial sector in the last decade of the nineteenth century. We see that the labor force participation of children before age 14 was miniscule, ranging from 0.008 percent to 0.05 percent of the total labor force.

INSERT TABLE 3 HERE

After age 14, however, children in urban areas could be employed legally. The first possibility was for them to work as a so-called "young assistant" *(mladistvy pomocnik*) which was a day-laborer below the age of 18, earning an average daily nominal wage of 0.2 Florins—25 percent of the average daily nominal wage of an unskilled male worker.[37] The other possibility was to become an *ucen*, 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 in the family firm. Unfortunately, the Pilsen Chamber of Commerce only provides information on daily nominal wages for *ucen* in the glass industry, which averaged 0.09 Florins. But it is reasonable to assume that the ratio between the wages of *ucen* and those of "young assistants" did not vary greatly across industries, which would give the result that the average daily nominal wage of an *ucen* was 45 percent of that of a "young assistant".

There was, however, one more option open to children above age 14. They could attend secondary school. There were two grammar schools ("Gymnasia") and two technical high-schools ("RealSchule") in Pilsen.[38] In addition, there were nine vocational schools, a teacher-

[37] The average nominal daily wage of a "young assistant" is calculated as the weighted average of "young assistant" daily nominal wages in the mining, metal, glass, wood, chemical, cloth and food industries in 1889; the weights are the shares of employed people between the ages of 14 and 18 in 1889. The sources are the same as for Table 2.

[38] The Gymnasia's curriculum was oriented at classical languages and humanities and afterwards students usually entered a university. RealSchule were practically oriented and served as a starting point for future engineers.

training school, an agriculture school, and a commercial high school. These schools provided a wide range of opportunities to obtain the education necessary for entering a university, obtaining a position as a clerk, or becoming a skilled worker.

The children's situation in rural areas was strikingly different. After age 12, they could work as either agricultural laborers or agricultural servants. They could also become apprentices, but there were very few such positions given the miniscule size of the hinterland's industrial sector. As for secondary education, the only possibility was an agricultural school in the nearby district of Rokycany. This meant that children enjoyed almost no opportunity to acquire any education after the primary level, and even this was often incomplete since they were permitted to work from age 12 onward. The only way to acquire secondary education was if parents sent their child to school in Pilsen. This was certainly possible, but student boarding facilities were not common in Pilsen, so we can be fairly certain that it was not widespread.

Staying in the countryside thus meant mainly working in the agricultural sector. Unfortunately, we do not have detailed information on child labor in agriculture. However, historical studies provide convincing evidence of the widespread use of children at that age in this sector.[39] Nor do we possess reliable estimates of child labor or the wages of young agricultural employees in Pilsen's hinterland. The closest proxy is therefore the ratio between the wages of adult unskilled workers and "young assistants" in Pilsen, assuming that the ratio held for both rural and urban areas; this yields an average nominal wage of 0.1 Florins.

We saw that children in Pilsen had many opportunities to acquire education and become skilled workers. If they decided to become apprentices, would it materialize into higher wages? To answer this question, we would need to estimate the returns to education in Pilsen. This is impossible due to lack of data. Nevertheless, to get at least a flavor of the possible gains from

[39] See Kodetová, "Zemědelské dělnictvo [Agricultural Workers]".

higher education, we can examine skilled and unskilled male wages, which suggest a skill premium of 125 percent.[40]

To summarize: in the town, children were virtually prohibited from working before the age of 14, whereas in the hinterland they could work from age 12 onward. Real earnings were 76 percent higher in Pilsen than in the hinterland (using the same cost-of-living and disamenity premium adjustment as for adult males). Pilsen also offered much brighter career prospects. Children could attain secondary education in one of the many secondary schools and become professionals, or they could become apprentices, learn industry-specific skills, become skilled workers, and earned a skilled worker's premium.

INSERT TABLE 4 HERE

Now that we know the mean expected wage for each type of family member, we can compare the opportunities facing a rural family when deciding whether to move to Pilsen or not. Table 4 shows family income in Pilsen and its hinterland 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 work (column III). The man's contribution to rural family income is 60.6 percent, while the woman and a child contribute 39.4 percent. In Pilsen, the man's contribution is 61.5 percent while that of the woman and a child is 38.5 percent. To put the numbers in a comparative perspective, in rural areas, the contribution of the man is 10 percent lower and the contribution of the woman and a child 20 percent higher than that suggested for

[40] This is computed as (skilled nominal wage – unskilled nominal wage)/unskilled nominal wage. The numbers are the urban skilled and unskilled male wage as reported in Table 2. 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 Chamber of Commerce reports do not provide sufficient information on the female skilled wage.

England in the study by Horrell and Humphries.[41] In the town of Pilsen, a man contributes around 10 percent more and a woman and child 10 percent less than the findings for England. The higher contribution of a man compared to the combined contribution of a woman and a child in Pilsen is most likely due to the legal restrictions on child labor in late nineteenth-century Bohemia. As for the rural areas, the discrepancies are most probably due to the low quality of the Bohemian data. Nevertheless, the margin of error is still acceptable. Even if the Bohemian figures were the same as the English figures in Horrell and Humphries, it would have no significant effect on the central results of the analysis here.

Table 4 reveals that the nominal rural-urban family income gap was 100 percent for a family in which only the husband worked. A family in which both parents or both parents and a child worked faced a rural-urban income gap of 96 percent. The gap must then be adjusted for the costs of living and disamenity premium. As in the case of a single worker, we also have information on the living expenses of a family living in rural and urban areas of the Czech lands in 1879.[42] Assuming that the ratio did not change a great deal over the ensuing 21 years, the real rural-urban family income gap was approximately 72–76 percent. The disamenity premium is again taken from Williamson, and the final figure lies in the range 65–69 percent. Such a gap provided a very strong impetus for a family to leave the hinterland. One very important implication of these numbers relates to children. Since the cost-of-living adjustment was computed for a family with children, we can infer from columns 1 and 2 of Table 4 that a family could afford to live in Pilsen even without child labor.[43] This provided a window of opportunity for children to obtain higher education.

To conclude, this section provided estimates of real rural and urban family income. The estimates show that the expected increase in real family income when a family moved to Pilsen around 1900 lay in the range 65–69 percent. Since the cost of living adjustment was computed

[41] The comparison families are low-wage agriculture and factory families in the period 1846–1865.

[42] See Purs, "Changes". The family consists of a man, wife and three children. The living expenses include food, clothing, rent, heat, light, domestic furniture, health insurance, and school fees.

[43] Specifically, the cost-of-living adjustment was computed for a family with three children.

from information on family expenditures and not from the price index, this indicates that at least potentially, the material needs of the family would have been satisfied. What about the children? After age fourteen, children could work as unskilled workers in the town and earn an urban wage premium. They could also attend secondary schools and acquire a higher level of education. Moreover, and even more importantly, the family could afford to send children to school since the family's real urban income would increase even though only the parents would work. This was a very important window of opportunity that opened for children. Was it exploited?

The Data

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 1958 families that includes the migrant population of the Pilsen suburbs, together with the population of "stayers" (non-migrants) from the political districts in Bohemia where the migrant population originated.[44]

The population of stayers were collected as a stratified sample. The data collection faced two problems. First, several districts sent only one or two families to Pilsen, which precluded making any reasonable statistical inferences relating to these districts. Second, the manuscript returns for a handful of districts did not survive. The first 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 second problem 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.

[44] The migrant population includes the population of the suburban villages of Lobzy and Skvrňany. The remaining three villages were not used because the manuscript returns were either missing or incomplete. Migrants in the dataset are permanent migrants. Families born in the city of Pilsen were excluded as they are not migrants but rather native population.

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.[45]

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 relationships within the family. Hence, for each individual we have two dates and sufficient kinship information to provide a picture of the family when it arrived in Pilsen. For example, Jan Chraston 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 Chraston family, consisting of a married couple who were 31 and 26 and two daughters aged 2 and 1 when they migrated to Pilsen.[46] This provides a unique dataset making it possible to reconstruct the age, gender and occupational composition of each family *at the time of arrival* in Pilsen and to test whether the family characteristics of

[45] The migrant families came to Pilsen from all over Bohemia as well as outside Bohemia. The manuscript returns lacked enough of information to locate the families coming from outside 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.

[46] 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. Unfortunately, this 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.

migrants arriving in the urban centre are those that would be expected if children's educational attainment constituted a significant motive for migration.

Using the sample of stayers raises one important issue. The migrants consisted of families that arrived in Pilsen over a fifty-year period. Ideally one would wish to have a sample of stayers covering the same time period. Unfortunately, this is impossible because the Habsburg census only started in the 1860s and large portion of the manuscript returns between then and 1890 do not survive.[47] But given that less than 8 percent of migrants arrived before 1890, very few observations are lost if they are excluded from the sample. This leaves a population of migrants arriving in the 1890s for whom a relevant comparison group must be found. Since the demographic transition in Bohemia accelerated only after about 1900, we can be fairly sure that the family structure of stayers did not dramatically change during the 1890s. This means that one can be fairly confident that using the population of stayers from the 1900 census will not bias the analysis.[48]

A detailed statistical description of the dataset is provided in Klein "All in the Family". Here I examine in details children's age since it is a crucial variable in our analysis. Table 5 calculates the average age of children in the families with children. When we examine *all* children in a family, we find that the average age of children in families lies very near the age when children start compulsory primary education. However, these numbers are biased upward by including adult children. When we examine the average age of children younger than eighteen years, we see that there is little decrease in average age of children. Most strikingly, the average

[47] The manuscript returns for the political district of Pilsen are almost complete; however the manuscript returns of other Bohemian political districts 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.

[48] The control group is also constructed such that it does not include villages which experienced severe depopulation due to out-migration. Thus, the control group is not biased toward older population but includes population which might have migrated but decided to stay.

age of children in migrant families remains very close to the age when children begin compulsory education.[49]

The regression analysis

We have seen that the real family income gap between Pilsen and its hinterland was 65–69 percent, depending on who in the family worked. This meant that a rural family had a very strong incentive to leave the village and start a new life in Pilsen. Furthermore, the expected family income increment in the town was large enough to offset the higher costs of raising children even when children did not work. Even more important, children could benefit from a higher quality of education in the town, as evidenced both by the wider choice of secondary schools and the wage gap between skilled and unskilled workers. We are now ready to investigate the key question—did families move to Pilsen also to invest into the human capital of their children?[50]

The regression equation takes the following form. The dependent variable is a dichotomous variable indicating whether the family is a migrant family or a "stayer" family. The independent variables consist of the age of the parents, the occupation of the household head, the number of children, the presence of children aged 5–6, the presence of children aged 12–14, the

[49] To rule out a mere coincidence, an extensive sensitivity analysis was conducted. It turns out that the results are robust—the average age of children in migrant families lies in the range 5–7 years. See Klein, "All in the Family", section 6.3.

[50] As we have seen in the previous section, the population of migrants also includes migrants from southern and northern Bohemia. The real family income gap is 42-46 percent for the families from southern and 29-33 percent for the families from northern Bohemia (the calculations and data sources are the same as those in Table 2). As for the educational opportunities, the families from southern Bohemia faced similar situation as the families from Pilsen's hinterlands. Northern Bohemia provided more opportunities for apprenticeship due to the developed textile industry. However, the textile industry was on decline at that time which gives a compelling reason to move to Pilsen and get education suitable for the growing industries.

occupation of children over age 14, and regional dummies.[51] The age of parents, the occupation of parents, the number of children, and regional dummies are "classical" explanatory variables included in most studies of migration.[52] The other variables are new, however, and take the form they do because of the Bohemian education and child labor laws in this period. As already discussed, labor laws prohibited children from working in the industrial sector before age 14, but allowed child labor in agriculture from age 12 onward. School laws made primary education compulsory from age 6 to 14. In light of our model, these laws have implications on the age structure of migrants' children. Parents, by moving to a town, give their children an opportunity for better quality education. To maximize their educational attainment in the town and hence their expected future income, parents should migrate when their children are about to start compulsory education. Therefore, the presence of children around age 6 should be conducive to family migration.[53] The implications of school and child labor laws on older children are more complicated. Children over age 12 were allowed to work in agriculture and since they were more productive in rural than urban areas (because children in the town could not work), their presence in the family should deter migration, *ceteris paribus*. But from age 14 on, children could work in industry. So, from the parents' perspective, *ceteris paribus,* having children aged 12–14 should keep the family in the rural area. However, this effect might not be important, given the very short time span of only two years during which children were more productive in rural areas. Once children reached age 14, the family would have an incentive to move to the town for two child-related reasons: first, the labor productivity of children is higher in towns than in rural areas, and second, there are more educational opportunities (both secondary school and

[51] The occupation of wives was not included because there is not enough of variation in the occupation of wives due to underreporting in the census records.

[52] The "classical" explanatory variables appear, for example, in Galenson et al., "Economic and Geographic Mobility"; Long, "Rural-Urban Migration"; and Steckel, "Household Migration, Urban Growth".

[53] This does not mean that the families with children younger and older than 6 do not migrate. It means that the families with children around the age 6 are systematically more likely to migrate than the families without them.

apprenticeship). Which of these three scenarios—work, school, or apprenticeship—would apply depended upon the parents' income. If, for example, it was high enough to cover the higher costs of raising children in the town, then the presence of children in a secondary school or in apprenticeship would be an indicator that parents had migrated because of the children's education.

Before examining the regression results, there is one econometric issue to discuss. The dataset takes the form of a clustered sample, since the families share their district of origin as a common factor. In the presence of clustered data, statistical inference based on methods that rely on random sampling may be incorrect.[54] In particular, errors may be correlated within clusters. For this reason, an estimator of standard errors is used that relaxes the assumption of independence within clusters.[55]

INSERT TABLE 6

The regression results are presented in Table 6. There are four different regressions. The first, presented in column I, includes all the "classical" regressors. The second, in column II, includes one new regressor, the presence of school-aged children. The third regression, in column III, analyses the effect of the families' children in more detail by including two additional regressors: the number of children aged 5–6, and the number of children aged 12–14. The last regression, presented in column IV, adds regressors related to the occupations of children over age 14.

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 adults who are young. Migration at later ages might be caused by a pattern where parents follow their migrating young-adult offspring. In all regressions, the occupation of the household head is positively related to migration, which is not a

[54] See for example Pepper, "Robust".

[55] Clusters in this case are the political districts.

surprise given the very significant real rural-urban wage gap for both unskilled and skilled workers.

In all regressions, too, the number of children has a negative impact on the probability of migration. There are two possible explanations for this: child labor and the quality-quantity trade-off. Child labor can explain this effect in two possible ways. First, it may be that children's productivity is higher in agriculture than 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 costs of childraising in urban 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. Nor does the second seem plausible. Even though child labor laws prohibited children in Pilsen from working until age 14, we saw that their parents earned more than enough to offset the higher costs of urban childraising.[56]

What about the explanation in terms of a quality-quantity trade-off? Do we have reason to believe that parents had a lower number of children because they wanted to invest in their children's human capital? The situation in Pilsen suggests this may indeed have been the case. First, the opportunity costs of women were higher in Pilsen that in the hinterland as there was a significant real female rural-urban wage gap. Second, the existence of a skill-premium and a wide range of secondary education opportunities both indicate that human capital investment in children would pay off and eventually catapult children upward on the socio-economic ladder. Therefore, it was optimal for parents to invest in the quality rather than the quantity of their children and thus have fewer children than the stayer counterparts.

[56] Although the costs-of-living adjustment was calculated from the expenditure of a family with three children, the reasoning still applies since the average number of children in migrant families was less than two.

What about the effect of the child-related explanatory variables? The second regression includes the presence of school-aged children interacted with the number of children as an additional regressor. The significance of the "classical" variables remains the same, and the "school-aged children" variable has a positive although insignificant impact on the probability of migration. Re-running the whole regression for the families coming from west Bohemia only, the "school-aged children" variable turns positive and statistically significant.[57] The positive impact of "school-aged children" suggests that children's education might play a role in the family migration. However, mixed significant results raise doubt about its explanatory power. Indeed, these results do not shed much light on the role of children in family migration. School-aged children are those between the ages of 6 and 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 dummy indicating 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 and contribute to family income. Thus, school-aged children might pick up two opposite effects. Therefore, we have to be cautious and not rush into the conclusion that the positive and for western Bohemia also significant effect of the school-aged children means that parents migrated because they wanted a better education for their children. Rather we have to investigate the family structure of migrants in more detail to see if it reflects the parent's aspirations to provide children with education.

For this reason, a third regression was estimated, using a more detailed breakdown in the age composition of the family's children—the number of children aged 5–6 and the number aged 12–14. The results show that the number of children aged 5–6 has a positive and significant impact on migration while the number of children aged 12–14 does not. (The effect of children aged 5–6 and 12–14 were also estimated as dummy indicators and these results were

[57] The additional sensitivity check results are not reported. They are available from the author upon request.

confirmed.)[58] This means that, *ceteris paribus*, the presence of a child who is about to start compulsory primary education motivates parents to migrate while the effect of children between 12 and 14 does not play a significant role. The significant effect of the presence of children between 5 and 6 strongly suggests that education matters in the parents' decision to migrate. Since the quality of education is higher in cities than in villages, a family that migrates to a city when their children are about to start primary compulsory education maximize children's educational attainment and hence the possibility of higher future income. Therefore, observing the family composition on arrival to Pilsen is such that the number of school-years is maximized strongly suggests that the parents are concerned about their offspring's human capital. The insignificant impact of the presence of children between 12 and 14 should not be a surprise. As was argued above, at that age children are more productive in the hinterlands than in the city implying that, *ceteris paribus*, a family should stay in the hinterlands. However, the time period is rather short, implying that the effect of children might not materialize. Instead of staying put, parents may think of being in the city as more beneficial, not only because of the large real rural-urban wage premium they would earn but also because of better secondary education opportunities for their children who are about to finish their primary education in the next one or two years. Thus, the final effect could be ambiguous and the results confirm this; although the estimated coefficient is negative, confirming the former argument, it is highly statistically insignificant.

The estimates of the children between 5 and 6 and between 12 and 14 could be, however, biased: the family might also move because these children have older siblings who could benefit either from employment opportunities or from secondary education in the town. Therefore it is

[58] In addition, a sensitivity check was conducted by running separate regressions in which the number of children between 5–6 was alternated with the number of children and then with the presence of children aged 5–7, 6–7, and 6; except for the last one, the estimated coefficients were not statistically significant, strongly indicating that families migrated shortly before or at the time their children started compulsory primary education.

important to control for the presence of children older than fourteen. Since there were three choices open to such children, three occupational dummies were included—the presence of a working child, the presence of a child in apprenticeship, and the presence of a child going to secondary school. The results are compelling: the presence of children aged 5–6 still encourages migration, as does the presence of a child in apprenticeship, which is highly statistically significant. Other dummies for child occupation are not significant. The fact that children were more systematically present in the occupations of apprenticeship indicates that families did not migrate out of a desire for additional income from a child working in the town. But it also indicates that families were not encouraged to migrate by the desire to send their children to urban secondary schools.

How can we interpret these results? The insignificance of the "working child" variable suggests that child labor was not a migration motive. The second result is, however, surprising. 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" (technical high-school) or a "Gymnasium" (grammar school). 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, these results cease to be so surprising. They no longer indicate that parents did not want to invest into children's education. Indeed, the strong significance of the apprenticeship dummy indicates the exact opposite. Being an apprentice meant that a child was in the position to obtain a valuable education in the form of practical training, which would then make it possible to become a skilled worker. The strong significance of "apprentice dummy" is in accordance with the labor market situation in Pilsen. As it was argued in the previous section, industrialization in Pilsen exhibited flexible form specialization rather than mass production. This implies that apprenticeship was more valuable than formal education. Thus finding that the children of migrant families are systematically more frequently present in the occupation of apprentice rather than worker strongly suggests that the migrant parents did indeed take their children's future careers seriously and invested into their human capital.

These results apply to migrant families that came from various places in Bohemia. Would they hold for the migrant families from the western Bohemia only?[59] I estimated the last specification of the regression equation in Table 6 for the migrant families coming from western Bohemia only for the whole period (1890–1900) and the period between 1896 and 1900.[60] The difference arises in the period 1896–1900: the presence of children in secondary education is now on the edge of statistical significance.[61] This indicates that as we approach the year 1900, the children in migrant families coming from western Bohemia begin to be systematically more present not only in the occupation of apprentice but also in secondary education institutions rather than in working positions. What might be a reason behind this shift in the importance of secondary education? A possible explanation would be that their parents were more likely to recognize the increasing importance of secondary education for the future prospect of their children—they wanted them to become professionals rather than skilled workers.

In sum, regression analysis shows that the families arrived in Pilsen when their children started the compulsory primary education. Also, grown-up children were more likely to be present in the occupations of apprentice rather than unskilled worker. Thus, we can answer the question asked at the end of the third section: did parents exploit the window of opportunity opened to their children—better education? Yes, parents did take advantage of the Pilsen education sector. They arrived to the urban area so that their children could spend the maximum time in the primary school and hence maximize their educational attainment. Also, the fact that grown-up children were systematically more present in apprenticeship than unskilled work confirms that parents valued their education more than their current contribution to the family income. All this convincingly suggests that parents invested into the human capital of their

[59] I focus on the western Bohemia because the sample of migrants from other regions is not large enough to conduct a sound quantitative analysis.

[60] This result also holds as we get closer to 1900. The results are not reported; they are available from the author upon request.

[61] I re-ran the last specification of the regression equation for various periods on the whole sample as well as on the sub-sample with western Bohemia only; the only differences that arose are the ones reported.

children and that the children's education was indeed an important impetus for the parents to leave the hinterlands and start a new life in the city.

How do these results compare with the existing migration studies? The negative effect of the parents' age is in tune with the previous studies of migration occurring at the beginning of the life-cycle, although Steckel's study on rural-urban migration fails to find a significant negative effect of age on migration.[62] The negative effect of an additional child confirms Steckel's results, but goes against Galenson et al.'s findings. It does not, however, constitute a controversy as the latter insignificant effect of children is consistent with the historical circumstances they analyzed.[63] The negative effect of an additional child on migration also agrees with recent studies.[64] As for the effect of children of a certain age, Steckel's study is the only one that 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 high urban costs of raising children. Studies on the twentieth century also show that school-aged children impede migration and argue for the ties to school and friends.[65] The results of this paper, although not in agreement with those studies, do not provide grounds for controversy. The effect of the higher costs of raising children suggested by Steckel was included into the analysis when it was shown that Pilsen provided a real urban premium large enough to offset the higher child rearing costs. It means that Steckel's conjecture that the higher costs of raising children in urban areas have negative effect on family migration does not hold in our case. The positive effect of school-aged

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

[63] Galenson et al. analyzed the situation of migration to the farming frontier. Another study by Steckel, "Household Migration and Rural Settlement", also fails to find a significant effect of an additional child on family migration, although in this study he analyzed rural-rural migration.

[64] See for example Long, "The Influence" and Nivalainen, "Determinants of Family Migration".

[65] See Long, "The Influence" and Nivalainen, "Determinants of Family Migration".

children on migration in our study as opposed to the twentieth century studies can be explained by the lack of friends and school ties as well. However, we should bear in mind that those studies do not address the issue of rural-urban migration and thus can not be considered as a direct comparison benchmark.

The results have several important implications for economic history and development literature. One regards studies of rural-urban migration during industrialization, the other development literature. As for the migration studies, there are two important implications. First, the role of children in the family during rural-urban migration turns out to be more complex and involved than suggested by previous migration studies. The migration decision of parents is not only a straightforward comparison of the children's net contribution to the family income. The decision-making also involves the children's education, which is a decision that profoundly affects the children's future. Therefore, future migration studies should broaden the intergenerational aspect of migration and consider the future of children below the age of independent choice as of equal importance in the migration decision as the future of adult decision-makers. Second, human capital investment played an important role in the migration to the city. The rural-urban wage gap was not the only reason there was a promise of a better future. The prospect of the education provided by cities was an important motivating factor too as it promised a socio-economic upgrade and hence a brighter future. Thus the 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. Therefore, historical migration studies should broaden the range of migration motives and explicitly consider human capital investment as an equally important migration motive as urban wage premium.

Recently, economic history as well as development literature has recognized the importance of rural-urban migration for economic development and growth.[66] Migration of rural population is viewed not only as labor reallocation process but also as the process of human capital investment. Rural migrants do not only leave low value added agricultural sector for high

[66] See for example Lucas, "Life Earnings", Williamson "Copying with City".

value added industrial and service sector. They also contribute to human capital accumulation, a crucially important factor for further economic development. The results of this paper show that human capital investment was indeed very important part of rural-urban migration decision and that reallocation of rural population to the city was connected with human capital investment. These results imply that a society's transition from an economy based predominantly on agricultural sector into an industrialized economy is a process that involves human capital accumulation. Therefore, economic history as well as development studies of industrialization should consider migration to cities as an indispensable channel of human capital accumulation, a crucial factor of economic development.

Before concluding, it is important to discuss the robustness of the results and the sample selection. Apart from the above-mentioned sensitivity checks, it was also checked whether the results would hold when some of the "classic" regressors were changed. There was not any effect from using the age of the household head and the number of boys instead of the average age of parents and the number of children as regressors. Nor did the presence of girls—either at any age or at school age—have any significant impact. Re-running the whole set of regressions for a sub-sample which included only families with children yielded the same results.

The sample selection question arises naturally from the fact that the migrants are a self-selected part of the population. The first issue is that we are working with a population of migrant families living in the suburbs. Could it be that the family structure of this population was different from that of migrant families living in the city itself? It does not seem very plausible that family structure would differ systematically. However, the migrant populations might differ in the occupation of parents—more skilled workers might live in the town because of their more prestigious jobs. In this case, we might observe more children in grammar schools and technical secondary schools rather than in apprenticeships, since skilled parents can provide more inter-generational human capital transfers than unskilled parents, allowing the children of skilled parents to be successful in those schools. But even if this were true, it would not change the main conclusion of this study. The only difference would be that the estimated coefficient of the

variable “school-attending children older than 14” would become statistically significant and the variable “children in apprenticeships” might lose its significance.

A more serious sample selection problem arises with regard to the occupations of children over age 14, which might be endogenous. As migrants are a self-selected part of the population, they move to a town when they expect to perform better than in their place of origin. In the case of children’s occupations, it could be that parents would move to a town when they expected their children to perform well in school or as apprentices. However, there is some indication that this was not the state of affairs in Pilsen. As we have seen, even an unskilled worker would earn a considerable urban wage premium. Therefore, parents should not have been too concerned about the ability of their children to perform well in schools. This does not mean that they would not want their offspring to achieve a better life. It just means that parents do not self-select based on the skills of their children, because they would certainly find a better life in the town anyway, as the unskilled real rural-urban premium suggests. This conjecture is certainly supported by the historical evidence, particularly by the agriculture survey conducted in the early 1890s which often mentions people leaving the countryside, no matter what their occupation, for higher-paid jobs in Pilsen.

Conclusion

This paper analyzed the human capital aspect of rural-urban migration by addressing the question whether migrants moved to a city to take advantage of the rural-urban wage gap or whether they also moved to invest into human capital. The results strongly suggest that migrants both took advantage of educational opportunities offered by the city and invested into human capital. In particular, patterns of rural-urban family migration in the last decade of the nineteenth century around the Bohemian city of Pilsen strongly suggest these reasons for migrating. This is reflected in the optimal composition of children in the family at the time of migrating from the countryside to a town: the migrant families moved to urban areas at the point when their children were ready to start compulsory education. Also, the adolescent children of such families were more likely to become apprentices and less likely to become unskilled workers. This strongly

suggests that parents wanted to maximize the educational attainment of their children and that they wanted to invest into the children's practical training rather than send them to work.

The results of this study have important implications for the economic history literature as well as the development literature. In particular, they imply that rural-urban migration during industrialization is also driven by human capital investment and that migration to the cities is not only a mechanism of labor reallocation. Therefore, historical migration studies should broaden the scope of possible migration motives and consider human capital investment as an equally important migration motive as the rural-urban wage gap. Moreover, the research on industrialization and development should consider migration to cities as an important channel of human capital accumulation because overlooking it would miss an important part of the process that transforms an agrarian economy into an industrialized economy.

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Table 1: Population Development in Pilsen and its Suburbs, 1857–1900

	1857	1859	1880	1890	1900
Pilsen	14269	23681	38883	50221	68079
Lobzy	136	183	242	790	3035
Doubravka	344	377	545	942	2402
Bolevec	440	504	681	1002	2255
Skvrňany	466	660	976	1807	3735
Doudlevce	305	305	444	774	1812

Source: Retrospektivní lexicon obcí ČSSR 1850–1970 [Retrospective lexicon of villages, Czechoslovakia 1850–1970].

Table 2: Average Daily Nominal Wages of Men and Women in Pilsen in 1889 and its Hinterland in 1893 and Rural-Urban Wage Gap Decomposition (Florins).

	Male	Female
Urban unskilled wage	0.8	0.3
Urban skilled wage	1.8	
Rural unskilled wage	0.4	0.16
	Unskilled rural-urban wage gap	
Nominal wage gap (%)	100	47
Adjusted for costs of living (%)	81	28
Adjusted for disamenity premium (%)	74	21

Source: Urban unskilled/skilled nominal wage is calculated from "Statistische Bericht", pages 475–515. Rural unskilled nominal wage is calculated from Karl et al., "Die landwirthschftlichen Arbeiter", Table 8, page 423; I assume 255 working days.

Cost-of-living adjustment is computed from Purš, "Changes", Table 11, page 205. Disamenity premium 7% is taken from Williamson, "Copying with City", page 250.

Note: The male urban unskilled nominal wage was computed as the weighted average of nominal 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 "Berichte", page 245; the male urban skilled nominal wage was calculated as the weighted average of nominal wages of urban skilled male workers in the same industries using the same weights; the female urban unskilled nominal wage was computed as the weighted average of nominal 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 "Berichte", page 245. Details on the computation of the rural unskilled nominal wage are given in note 24. Computations by the author.

Table 3: Employment of Children in Pilsen's Industrial Sector, 1890–1900.

Year	Age 10–12 (%)	Age 12–14 (%)	Total Employment
1890	0	16 (0.05)	32227
1891	0	1 (0.005)	19851
1892	0	0 (0)	18248
1893	0	9 (0.04)	24312
1894	-	-	-
1895	0	13 (0.04)	16693
1896	1	1 (0.005)	20444
1897	0	2 (0.008)	25744
1898	0	4 (0.02)	23234
1899	1	15 (0.06)	24383
1900	0	9 (0.032)	27489

Sources: Berichte der k.k. Gewerbe-Inspektoren uber die Heimarbeit in Oesterreich 1890–1893 and 1895–1900, pages 234, 234, 288, 248, 214, 201, 201, 209, 217, and 207, respectively.
Notes: Percentages are computed as the ration of employment in an age category to total employment. Computations by the author.

Table 4: Family Nominal Income in Pilsen in 1889 and Pilsen's Hinterland in 1893 and Rural-Urban Family Income Gap Decomposition (Florins).

	Family I [a] (1)	Family II [b] (2)	Family III [c] (3)
		Pilsen	
Male wage	0.8	0.8	0.8
Female wage		0.3	0.3
Child over 14 wage			0.2
Family income	0.8	1.1	1.3
		Pilsen's hinterland	
Male wage	0.4	0.4	0.4
Female wage		0.16	0.16
Child over 14 wage			0.1
Family income	0.4	0.56	0.66
		Rural-urban family income gap decomposition	
Nominal income gap (%)	100	96	96
Adjusted for cost-of-living (%)	76	72	72
Adjusted for disamenity premium (%)	69	65	65

Source: Table 2 for male and female nominal wage, for child nominal wage see text. Costs-of-living adjustment is computed from Purš, "Changes", Table 12, page 206. Disamenity premium is 7% and it is taken from Williamson, "Copying with City", page 250.
Note: [a] is the sum of unskilled male nominal wage, [b] is the sum of unskilled male and female nominal wage, [c] is the sum of unskilled male, female and child nominal wage. Computations by the author.

Table 5: Family Characteristics of Migrants and Stayers: Average Age of Parents, Average Age of Children, Average Number of Children in Family, 1890–1900.

	N (%)	Husband	Wife	Children	Children under 14	Number of children
Migrants	979 (50)	34.2	30.5	6.8	5.5	1.7
Stayers	979 (50)	46.5	42.8	10.9	7.6	3.1

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

Table 6: Probit Analysis: Determinants of Family Rural-Urban Migration, 1890–1900.

	I		II		III		IV	
	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	-0.051*** (0.019)	-0.018	-0.051*** (0.019)	-0.018	-0.051*** (0.001)	-0.018	-0.05*** (0.018)	-0.018
(Average age of parents)^2	0.001*** (0.0002)	0.0003	0.001*** (0.0003))	0.0003	0.001*** (0.0003)	0.0003	0.001*** (0.0002)	0.0003
Skilled	1.29*** (0.226)	0.47	1.28*** (0.26)	0.47	1.29*** (0.29)	0.47	1.28*** (0.26)	0.47
Unskilled	0.58*** (0.2)	0.21	0.59*** (0.2)	0.21	0.58*** (0.2)	0.21	0.58*** (0.23)	0.21
Children								
Number of children	-0.14*** (0.03)	-0.052	-0.18*** (0.06)	-0.065	-0.15 (0.029)	-0.05	-0.16*** (0.034)	-0.06
(Number of children) x presence of school-aged children			0.037 (0.03)	0.013				
Number of children between 5 and 6					0.11* (0.06)	0.04	0.14** (0.06)	0.05
Number of children between 12 and 14					-0.056 (0.11)	-0.02	-0.058 (0.11)	-0.02

Table 6: Continuation

Working children older than 14				0.063 (0.13)	0.02
School attending children older than 14				0.14 (0.17)	0.05
Children in apprentice older than 14				0.88*** (0.33)	0.34
Regional Dummies	YES	YES	YES	YES	
Constant	YES	YES	YES	YES	
N	1958	1958	1958	1958	
Pseudo R^2	0.2588	0.2597	0.2597	0.264	
Log Likelihood	-1006.007	-1004.7	-1004.716	-998.66	
Prob	0.000	0.000	0.000	0.000	

Source: Manuscript returns of the 1900 decennial population census of the Habsburg monarchy.
* = Significance at 10% level.
** = Significance at 5% level.
*** = 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: Farmers, Children's occupation: Working children in agriculture, Regional Dummies: North Bohemia.