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ABSTRACT

Based on unique register data of male immigrants in Denmark, we investigate whether self-employment is used as a last resort. To identify self-employment as a last resort, we define different types of immigrants as a function of transition probabilities between wage-employment, non-employment and self-employment. The transition probabilities are estimated using discrete competing risks models controlling for unobserved heterogeneity and duration dependence. We find that for certain groups of immigrants, a large fraction can be characterized as using self-employment as a last resort.

I. Introduction

Immigrants tend to have a much higher self-employment rate than natives. This has been documented, for example, by Borjas (1986) and Yuengert (1995). Borjas (1999) provides evidence that immigrants do not perform as well on the labor market as natives with similar characteristics. This suggests two different possibilities why immigrants are more likely to choose self-employment: Immigrants have more often characteristics that prompt self-employment compared to natives, or immigrants meet barriers on the labor market that force them to choose self-employment.

The central question examined in this paper is whether some immigrants use self-employment as a last resort. We embed immigrants using self-employment as a last resort into a type of immigrants denoted self-employed marginalized. They are self-employed without real economic prospects, and on average they would have been better off as wage-employees. Others have found evidence that can be interpreted as evidence for existence of self-employed marginalized immigrants. From interviews with 232 Danish immigrants from non-Western countries, Schultz-Nielsen (2001) found that 18% became self-employed because they were unable to get a job, and she reports even higher numbers for Sweden.

To examine the existence of self-employed marginalized, we propose a method based on transition probabilities between labor market states. To identify a self-employed marginalized, it is necessary to consider all three labor market states: self-employment, wage-employment and non-employment. Only few studies are based on both transitions into and out of self-employment, and among these focus has been on the choice between self-employment and wage-employment only (Le 1999). By including the state non–employment we do not ignore that immigrants may have transitions to non-employment as well.

When using transition probabilities to identify self-employed marginalized, it is crucial to control for other relevant explanations of self-employment. In particular, we allow for effects found in the literature to matter for choosing self-employment. One effect is that immigrants may use self-employment as a *stepping-stone into wage-employment* (Light 1984). Yuengert (1995), Hammarstedt (2001) and Hout and Rosen (1999) have found an effect from a *self-employment tradition* in the country of origin. *Business cycles* and re-employment prospects can affect entry to and exit from self-employment. Meager (1992) interprets procyclical entry rates as a consequence of demand side factors, whereas Carrasco (1999) mentions good re-employment prospects as an alternative explanation. Borjas (1986) argues that ethnic enclaves, as defined by

a high fraction of immigrants from a certain region, are a significant explanation of self-employment among immigrants. The argument is that it is easier to attract customers and employees in an area with inhabitants of similar ethnic origin (Borjas and Bronars 1989). The evidence, however, is mixed. Clark and Drinkwater (2000) find a negative effect, whereas Aldrich and Waldinger (1990), Yuengert (1995) and Bager and Rezaei (2001) find no effect of ethnic enclaves. In some sectors there is a considerable need for capital when starting a business. Therefore *liquidity constraints* need to be considered (Lindh and Olsson 1996; Blanchflower and Oswald 1998; Evans and Jovanovic 1989; Taylor 2001). To loosen the liquidity constraints, public self-employment support has been introduced in many countries including Denmark. The success of such a support has been questioned (Pfeiffer and Reize 2000).

We estimate the transition probabilities using discrete competing risks models. The data are register based panel data sets for 1984-97 for 40% of all male immigrants in Denmark and a sample of 2% of the male native population. The data have several advantages. Firstly, it is a long panel of 14 years. Secondly, the data are known to be very reliable and precisely measured.

The empirical analysis reveals that immigrants have very different transition patterns compared to natives. For immigrants from Western countries, this is mainly due to differences in individual characteristics. When controlling for individual characteristics, we find that the populations of immigrants from Western countries are not self-employed marginalized. For immigrants from non-Western countries, however, the picture is significantly different. For these immigrants we find that a large proportion is characterized as self-employed marginalized, even when controlling for observed and unobserved individual characteristics. For immigrants from Turkey, Vietnam, Iran and immigrants with no citizenship, more than half of the population are identified as self-employed marginalized. This indicates that these immigrants use self-employment as a last resort.

In section II, the different types of immigrants are defined, and the self-employed marginalized type is discussed in detail. The data for the empirical analysis are presented in section III. The analysis ignoring individual characteristics is found in section IV. In section V, the discrete competing risks model is presented followed by the results of the estimation in section VI. Section VII concludes the paper.

II. Identification of Types

We propose a new framework to investigate the existence of self-employed marginalized. The framework consists of types of immigrants defined by their transition

probabilities between labor market states relative to natives. The labor market states are self-employment (SE), wage-employment (WE) and non-employment (NE). Figure 1 illustrates all possible transitions between the three states.
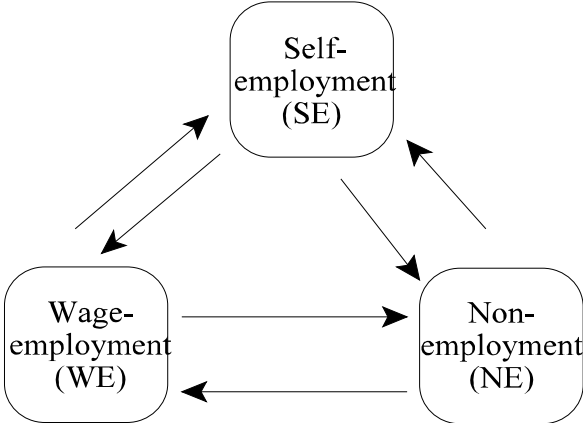
Figure 1
Transitions Between Three Labor Market States

The transition probabilities of immigrants are investigated relative to natives. For example, an immigrant in state NE can exit to WE and SE. Among these two exits, one can dominate the other in terms of transition probabilities relative to natives. Suppose that the probabilities of both transitions from NE to SE and from NE to WE are 0.5 for immigrants, whereas the corresponding probabilities for natives are 0.4 and 0.6. Then transitions from NE to SE dominate transitions out of NE for immigrants relative to natives. We call such a transition a relatively dominant transition.

A relatively dominant transition is determined by the transition probabilities of an immigrant compared to those of a native with the same characteristics and duration in a given state. Since our interest will be to study differences in transition behavior, we consider probabilities conditional on exit from a given state. Let x_0 be a vector of individual characteristics and d_0 the duration in a state. Then a state 1 is defined to be a relatively dominant transition out of state 0 if:

$$P_I(S_t = 1 \mid S_{t-1} = 0, S_t \neq 0, x_0, d_0) - P_N(S_t = 1 \mid S_{t-1} = 0, S_t \neq 0, x_0, d_0) > 0,$$

where subscripts I and N refer to an immigrant and a native, respectively. When there are two

exits, as in our case, there is one or no relatively dominant transition from each state. The values of x_0 and d_0 are the same for the immigrant and the native. For practical purposes, one needs to choose which characteristics to condition upon. One suggestion would be to use characteristics of a median immigrant. Then the transition probabilities of a (non-existing) native using the same characteristics are constructed to determine whether a state constitutes a relatively dominant transition from the state of exit.

With three states it is possible to define eight exhaustive types of immigrants based on relatively dominant transitions. They are listed in Table 1. For example, an immigrant of Type 1 has non-employment as the relatively dominant transition from both self-employment and wage-employment, and self-employment as the relatively dominant transition from non-employment. It means that an immigrant of Type 1 is more likely to exit into non-employment from self-employment or wage-employment, and to self-employment from non-employment compared to a native with the same characteristics and duration in the exiting state. Later in this section, more details are provided about the types.

Table 1

Types of Immigrants

Type	Relatively dominant transition			Description	Characterization	
no	Out of SE	Out of WE	Out of NE		Attractor state	Escape state
1	NE	NE	SE	Self-employed marginalized	NE	SE
2	NE	NE	WE	Wage-employed marginalized	NE	WE
3	NE	SE	SE	Self-employment tradition	SE	NE
4	NE	SE	WE	Stepping-stone to SE	-	-
5	WE	NE	SE	Stepping-stone to WE	-	-
6	WE	NE	WE	Wage-employment tradition	WE	NE
7	WE	SE	SE	Self-employment tradition	SE	WE
8	WE	SE	WE	Wage-employment tradition	WE	SE

For six of the eight types, the same relatively dominant transition occurs twice. For example, for Type 1, the state non-employment is a relatively dominant transition from the other two states. We denote such a state an attractor state because immigrants are relatively more likely to make

transitions into this state compared to natives. If an attractor state exists, we define an escape state as the relatively dominant transition state from the attractor state. In case of Type 1, the escape state is self-employment since this is the relatively dominant transition from the attractor state non-employment. The characterization of states as attractor and escape states will be useful to highlight differences to natives.

Immigrants with non-employment as attractor state are more likely than natives to make transitions from other states into non-employment. Being outside employment is typically denoted marginalized. In our framework, we denote immigrants with attractor state non-employment as marginalized. Two types of marginalized immigrants exist, namely Type 1 and Type 2. The only difference is that Type 1 has self-employment as escape state whereas Type 2 has wage-employment. Therefore, we call Type 1 self-employed marginalized and Type 2 wage-employed marginalized. The relatively dominant transitions of a self-employed marginalized immigrant are marked in Figure 2 with bold arrows.
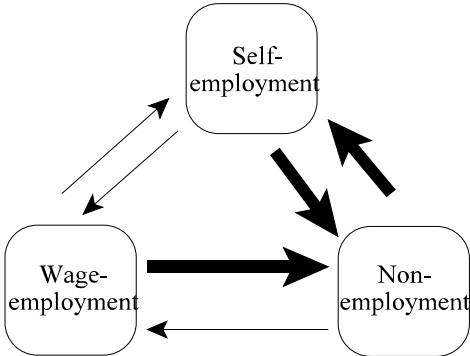
Figure 2
Self-employed Marginalized

Our definition of self-employed or wage-employed marginalized differs from the usual definition of marginalized. Usually, marginalized individuals in the labor market are non-employed with high probability. This probability, however, can be decomposed into two sources: a low probability of leaving non-employment and a high probability of becoming non-employed. While numerous important studies have focused on the former, our framework allows us also to

analyze the latter.[1] In the remaining part of the paper, we focus solely on marginalization as defined above by use of transition probabilities.

A. Self-employed Marginalized and Self-employment as a Last Resort

The central empirical question posed in the introduction is whether some immigrants use self-employment as a last resort. Using the types defined in Table 1, we define a self-employed immigrant of Type 1, the self-employed marginalized type, to be an immigrant using self-employment as a last resort. A non-employed immigrant can be a self-employed marginalized type but will be using self-employment as a last resort only if he actually becomes self-employed. A self-employed marginalized immigrant in non-employment or wage-employment can thus be thought of as an immigrant potentially using self-employment as a last resort.

According to the definition in Table 1, the transition probabilities of a self-employed marginalized satisfy the following three conditions:

i) $\quad P_I(S_t = NE \mid S_{t-1} = SE, S_t \neq SE, x_t, d) - P_N(S_t = NE \mid S_{t-1} = SE, S_t \neq SE, x_t, d) > 0$

ii) $\quad P_I(S_t = NE \mid S_{t-1} = WE, S_t \neq WE, x_t, d) - P_N(S_t = NE \mid S_{t-1} = WE, S_t \neq WE, x_t, d) > 0$

iii) $\quad P_I(S_t = SE \mid S_{t-1} = NE, S_t \neq NE, x_t, d) - P_N(S_t = SE \mid S_{t-1} = NE, S_t \neq NE, x_t, d) > 0$

Condition i) insures that a self-employed immigrant is more likely to exit to non-employment than to wage-employment compared to a native. Condition ii) insures that this is also the case from wage-employment. Conditions i) and ii) imply that non-employment is an attractor state. Finally, condition iii) insures that the immigrant is more likely to become self-employed than a native with the same characteristics when exiting from non-employment.

The conditions stated above do not relate to the survival probability as self-employed because the implications for the survival rate are ambiguous. On the one hand, a self-employed marginalized immigrant may have a lower survival rate due to a lack of entrepreneurial skills. On the other hand, if the alternatives to self-employment are poor, for instance non-employment, then one would expect self-employed marginalized to have a higher survival rate as self-employed. This is a reason for using the relatively dominant transition probabilities.

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[1]

We are not the first to apply combinations of transition rates to identify a labor market state. Though focusing on marginal attachment to the labor force rather than marginalization, Jones and Riddell (1999) also used transition probabilities to identify a new labor market state.

As mentioned in the introduction, a number of hypotheses concerning self-employment of immigrants have been suggested in the literature. As we will show, some of them correspond to the types defined in Table 1. Suppose condition i) does not hold, but ii) and iii) do. Then an immigrant is Type 5, see Table 1. A Type 5 immigrant does not have an attractor state. He is more likely than natives to exit non-employment to self-employment, self-employment to wage-employment and finally back from wage-employment to non-employment. Such a pattern can be caused by using self-employment as a stepping-stone to wage-employment. The mechanism is that immigrants may obtain skills (e.g. profiency in language) while working as self-employed, which will improve their chances to become wage-employed. Suppose now condition ii) does not hold but i) and iii) do. Then the immigrant is Type 3. A Type 3 immigrant has self-employment as an attractor state. Hence, the immigrant is more likely to become self-employed when leaving one of the other two states than a native. Such a behavior could be induced by a self-employment tradition relative to natives, for instance, if the immigrant came from a country with a high rate of self-employment. Finally, suppose condition iii) does not hold, but i) and ii) do. Then the immigrant is Type 2. Non-employment is an attractor state, and the immigrant is marginalized in the sense we discussed above. The difference to the self-employed marginalized is that the immigrant is more likely to exit non-employment to wage-employment compared to natives.

In characterizing an immigrant, for instance, as self-employed marginalized, the immigrant is compared to a native with exactly the same individual characteristics. The only observable difference is country of origin. Hence, if there is to be a difference between immigrants and natives, it can only arise from two sources: country of origin or different relationship between individual characteristics and transition probabilities. In either case, the factors that lead to a difference, for instance, in coefficients on observable characteristics are unobserved. The factors could be barriers in the labor market, e.g. discrimination.

In order to ascribe differences in transition behavior to barriers, it is critical in the empirical implementation, that relevant individual differences in, for instance, preferences are captured by the characteristics included in the estimation. If this is not the case, condition i) to iii) would also be consistent with an immigrant having strong preferences for not working and preferring self-employment to wage-employment. In addition to controlling for preferences including many individual characteristics, we are also able to exploit the panel data structure of our data. This allows us to control for unobserved heterogeneity, and therefore we are likely to capture unobserved time-invariant differences in preferences.

Finally, variation on some characteristics can be used as an indirect check of preference differences. In the empirical implementation, we focus on two variables in this respect. The first variable concerns changes in the transition rates over the business cycle. If immigrants experience transitions from non-employment into self-employment in a recession, whereas natives do not, it suggests that when the general unemployment is high and the chance of getting a job is low, immigrants tend to start as self-employed. This indicates that immigrants use self-employment as a last resort. The second variable concerns entitlement to unemployment benefit. If there are preferences for not working, self-employment may be used as a way of obtaining eligibility for unemployment insurance benefit. Hence, this should lead to transition from self-employment to non-employment as soon as the eligibility is obtained.

III. Data

The empirical study is based on longitudinal data sets from Danish administrative registers. One data set contains information on all immigrants in Denmark (about 300,000 individuals in 1997) aged 15 and above[2] in the period 1984-1997. We randomly select 40% to reduce the sample, and furthermore we exclude 2nd generation immigrants. In order to compare with natives, a second data set is used based upon a 10% panel sample of the whole Danish population aged 15 and above (about 500,000 individuals each year). We select men aged 30-50 since this group has finished education, but not started early retirement. To obtain data on all important variables, we use annual observations. We base the empirical analysis on the years 1988-1997 and only apply the observations from 1984-87 to draw inference on spell durations and reduce problems of left-censoring. The final sample of immigrants contains 118,838 observations from 22,243 immigrant men, and the sample of natives contains 121,628 observations from 18,723 native men. All the variables included are described in Appendix A. In the following, we discuss some of them.

The labor market status, which forms the basis for the construction of the dependent variable, is divided into three different states: self-employment[3] (SE), wage-employment[4] (WE) and non-employment (NE). If an individual experiences more than one state in a year, the predominant

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[2] For a further description of immigrants in Denmark and the applied data set, see e.g. Husted et al. (2001).

[3] Incl. agriculture (roughly 20% of natives).

[4] Incl. part-time employment, which is a small number.

state is chosen.

Table 2 shows the distribution of labor market states for natives and immigrants from different countries of origin. The countries of origin consist of the following groups: Scandinavia, EC-12[5], Ex-Yugoslavia, other developed countries (DCs), Turkey, Pakistan, Vietnam, Iran, no citizenship (Palestine) and other less developed countries (LDCs). In contrast to many other OECD countries, the rate of self-employment of males in Denmark has decreased during the last ten years (Leung and Robinson, 1998; Blanchflower, 2000). For immigrants from less developed countries, the self-employment rates are higher than for natives in 1997 except for the residual category of other LDCs. From 1988 to 1997 there is a steep increase in the proportion of self-employment for immigrants from most less developed countries. The steep increase in the self-employment rates for Turks and Pakistanis was coupled with an increase in non-employment, whereas for Iranians and immigrants without citizenship, it was coupled with an increase in wage-employment. This is suggestive for self-employment being used for different reasons for immigrants from different countries. The pattern in Table 2 conceals, however, that all variation is due to changing background factors and individual characteristics.

Table 2

The Distribution on Labor Market States for Males Aged 30-50

	Self-employment[x]			Wage-employment			Non-employment		
	1988	1992	1997	1988	1992	1997	1988	1992	1997
	----- % -----								
Natives	11.5	10.5	9.0	74.2	70.6	73.2	14.3	18.9	17.8
Immigrants									
Scandinavia	9.1	9.8	8.6	62.8	59.1	62.9	27.5	31.2	28.4
EC-12	11.3	12.4	12.4	67.4	61.6	60.5	21.3	26.0	27.1
Ex-Yugoslavia	6.0	5.8	3.3	68.2	58.4	35.9	25.0	35.8	60.9
Other DCs	10.4	12.0	10.7	60.0	53.3	55.6	29.5	34.7	33.7
Turkey	5.8	10.8	15.9	58.0	45.6	44.3	36.2	43.6	39.7
Pakistan	15.7	21.0	22.3	53.7	38.3	38.4	30.6	40.6	39.3
Vietnam	9.4	9.9	10.7	50.9	40.2	49.7	39.7	49.9	39.6
Iran	4.4	6.3	16.0	17.4	34.6	33.0	78.1	59.1	51.0
No Citizenship	5.2	7.0	14.4	14.0	21.4	17.1	80.8	71.5	68.5
Other LDCs	9.7	9.1	8.7	49.5	42.5	38.9	40.8	48.3	52.4

[x] Including agriculture.

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[5] EC-12 contains the 12 EU member states prior to the expansion in 1997.

To control for individual characteristics and effects mentioned in the introduction, we have obtained data on individual eligibility for unemployment benefit and when the unemployment benefit expires. Eligibility to self-employment support and when it expires is also available. In addition to entitlement and expiration indicators, data also include educational attainment, labor market experience, an indicator for living in a big city and finally an indicator for being a property owner. For immigrants, age at migration, country of origin and immigrant status (refugee/non-refugee) are observed. We also include the concentration of immigrants in a local area and whether the individual is a Danish citizen and cohabits with a native. Further details are given in Appendix A.

IV. Identification of Types Ignoring Individual Characteristics

In this section, we explore transitions between the states ignoring individual characteristics except country of origin. We use the prefix unconditional on the corresponding transition probabilities to indicate that individual characteristics have not been taken into account.

In Table 3, we compare unconditional transition probabilities between natives and immigrants.

Table 3

Unconditional Transition Probabilities

Natives	SE(t)	WE(t)	NE(t)
SE(t-1)	0.875	0.089	0.037
WE(t-1)	0.015	0.944	0.041
NE(t-1)	0.026	0.180	0.794
Immigrants			
SE(t-1)	0.820	0.080	0.100
WE(t-1)	0.020	0.853	0.127
NE(t-1)	0.033	0.169	0.797

The main noticeable difference between immigrants and natives is the transition probabilities out of self-employment and wage-employment into non-employment. These probabilities are larger for immigrants compared to natives.

Our definition of types is based on the transition probabilities conditional on leaving the state. The result with no control for individual characteristics is shown in Table 4. The first three

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columns refer to the transition probabilities used in conditions i) to iii). In column four, we indicate the most likely type of immigrant as defined in Table 1.

Table 4

Identification of Types Ignoring Individual Characteristics

	Transition probabilities in condition			**Type**
	i)	ii)	iii)	
Natives	0.294	0.732	0.126	
Immigrants	0.556	0.864	0.163	1
Scandinavia	0.433	0.814	0.182	1
EC-12	0.427	0.817	0.134	1
Ex-Yugoslavia	0.324	0.920	0.069	2
Other DCs	0.517	0.816	0.173	1
Turkey	0.726	0.923	0.124	2
Pakistan	0.660	0.860	0.224	1
Vietnam	0.859	0.922	0.184	1
Iran	0.744	0.880	0.292	1
No Citizenship	0.866	0.890	0.360	1
Other LDCs	0.629	0.895	0.147	1

The immigrant groups have very different transition probabilities compared to natives, and they are all of the two marginalized types. Immigrants from Ex-Yugoslavia and Turkey are the wage-employed marginalized type while the remaining groups are the self-employed marginalized type. Since the determination of types in Table 4 ignores individual characteristics, it raises the question the explanation is different (human capital) characteristics among immigrants compared to natives. We investigate this in the remaining part of the paper.

V. Discrete Competing Risks Model

To determine the immigrant types after conditioning on individual characteristics, it is necessary to estimate a model of the transition probabilities between all three states. Since the durations in our panel data set are measured discretely, we estimate a discrete competing risks

model. We allow for duration dependence and unobserved heterogeneity in terms of random effects.

The discrete competing risks model can be formulated using transition probabilities. We estimate transitions out of a state separately for each state. For the sake of notation, focus on transitions from a state 0. Let $P_{0m}(d)$ be the :transition probability of leaving state 0 and entering state m as a function of the duration, d, in state 0. The transition probability is a function of individual characteristics. Let X_{it} denote the observed vector of explanatory variables for individual i at time t and Z_i an unobserved individual effect. The duration dependence is modelled using dummy variables. Define a five dimensional vector, D_t, consisting of five dummy variables, where only one of them is 1 corresponding to the duration being equal to either 1, 2, 3, 4 or ≥ 5 years. This leads us to a transition probability of a linear index given by $P_{0m}(D_t{}'\gamma^m + x_{it}{}'\beta^m + Z_i^m)$, where β^m and γ^m are vectors of coefficients.

The transition probabilities are assumed to be multinomial logistic. It is necessary to make a normalization to identify the parameters. We set all parameters equal to zero for m equal to 0. Then the transition probability is:

$$P_{0m}(d) = \frac{\exp(D_t{}'\gamma^m + X_{it}{}'\beta^m + Z_i^m)}{1 + \sum_{k=1}^{2} \exp(D_t{}'\gamma^k + X_{it}{}'\beta^k + Z_i^k)}$$

To derive the likelihood function, first consider the likelihood contribution conditional on the unobserved heterogeneity Z. To keep notation tractable, let J^0 be the number of time periods spent in state 0, $\{t_1^0,..,t_J^0\}$ the time periods in calendar time spent in state 0 and $c_t \in \{0,1,2\}$ the state to which the individual exits at the end of time t. Then the likelihood contribution of individual i is:

$$L_i^0(\beta,\gamma|Z) = \prod_{j=1}^{J^0} \prod_{m=0}^{2} (P_{0m}(D_{t_j^0}{}'\gamma^m + X_{it_j^0}{}'\beta^m + Z_i^m))^{I(c_{t_j^0}=m)},$$

where I() is the indicator function. The expression is equivalent to the likelihood contribution in a multinomial logit model with three alternatives.

The unobserved heterogeneity is estimated as random effects in each risk. We follow the practice of Heckman and Singer (1984) by assuming that the random effects are discretely

distributed with unknown support points. The distribution of Z_i^m is assumed to have a support of two points in each risk, where one of the points in each risk is normalized to 0. Hence, the joint distribution of (Z^1, Z^2) has support $\mathscr{E} = \{(0,0), (0,\mu^2), (\mu^1,0), (\mu^1,\mu^2)\}$, where each outcome occurs with probability π^{00}, π^{02}, π^{10} and π^{12}, respectively. The four points of support in $\mathscr{E}$ can be interpreted as four latent types of individuals.[6] Let $\mu = (\mu^1,\mu^2)$ and $\pi = (\pi^{00},\pi^{02},\pi^{10},\pi^{12})$. We assume the $Z_i^{m'}$s are independent over individuals and that they are independent of the explanatory variables. Then the likelihood contribution for an individual can be obtained by integrating the conditional likelihood contribution:

$$L_i^0(\beta,\gamma,\mu,\pi) = \sum_{s\in\mathscr{E}} L_i^0(\beta,\gamma|Z=s)\pi(s),$$

where $\pi(s)$ is the probability of the outcome s. Finally, the likelihood function is the product over all individuals. Since we do not assume any restrictions between transitions from the different states of exit, we can estimate a model for each state of exit separately based on a likelihood function similar to the one derived here for state 0.

VI. Results with Individual Characteristics

In this section we discuss the results from the estimation of the discrete competing risks model and the identification of types. In subsection A, we discuss the estimates from the model, and in subsection B we focus on types and how they change dependent on the duration in different states. Finally in subsection C, we investigate the type of all the immigrants in order to identify the proportion of self-employed marginalized among immigrants. This proportion for self-employed immigrants is an estimate of the proportion of immigrants using self-employment as a last resort.

A. Estimates from Discrete Competing Risks Models

We estimate three discrete competing risks models for immigrants and three for natives. The three estimated models for immigrants give the transition probabilities from each of the three states, and similarly for natives. The results are presented in Tables B1 and B2 in Appendix B.

The duration dependence is negative in all states for both natives and immigrants. This can be seen on the decreasing values of the coefficients to the duration dummies, γ. The negative

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[6] Not to be confused with types defined in section II.

duration dependence implies that the probability of making a transition out of a state decreases with the duration in that state.

We control for effects reported in other empirical studies mentioned in the literature review in the introduction. Below, we comment on several of these effects.

One effect comes from ethnic enclaves. A higher concentration of immigrants in the area of residence exerts a negative effect on all transition probabilities out of a state. For example, a higher concentration of immigrants lowers the probability of exiting self-employment, but it also lowers the probability of entry into self-employment from the two other states. The overall effect cannot be calculated directly. For our purpose, the overall effect is not important. What is important is that the model controls for ethnic enclaves.

Another effect stems from liquidity constraints. Several variables control for this effect. One is the Public Self-employment Support (PSS). This support facilitates the process of establishing a business. One would expect the variables indicating entitlement to public self-employment support to increase the transition probailities from non-employment to self-employment. One would also expect the variables indicating the expiration or non-existence of entitlement to public self-employment support to increase the transition probabilities from self-employment. The results in Table B2 confirm both expectations.

Self-employment can be used to obtain entitlement to Unemployment Insurance Benefit (UIB). If it is the case, the variables indicating entitlement to UIB should be positive when exiting self-employment to non-employment. This, however, is neither the case for immigrants nor for natives in Tables B2 and B1, respectively. Hence, the results do not provide evidence that immigrants or natives use self-employment to obtain entitlement to the unemployment benefits.

In periods with high local unemployment, immigrants tend to enter self-employment from non-employment, whereas this does not happen for natives. As argued in section II, this may be interpreted as a piece of evidence for immigrants using self-employment as a last resort.

Unobserved heterogeneity plays a role in most of the transition probabilities. There is evidence of four latent types of individuals when determining the transitions out of self-employment and wage-employment. Out of non-employment, there is only evidence of one latent type for immigrants and two for natives.

B. Identification of Types Controlling for Individual Characteristics

In this subsection, we investigate how the duration dependence influences the determination of

immigrant types introduced in section II. The types are determined from the transition probabilities of an immigrant compared to a native conditional on the same characteristics and duration.

To illustrate the impact of duration dependence, we choose to focus on the countries Turkey, Pakistan, Vietnam, Iran and immigrants with no citizenship. A (non-existing) standardized individual is constructed with characteristics chosen as the median of the characteristics[7] over all the immigrants from these countries. For this standardized individual, conditional transition probabilities are calculated for each country using the country-specific dummy variable. Therefore, the only difference in transition probabilities among immigrants with characteristics of the standardized individual arises from the country-specific dummy variables whereas differences to a native with the same characteristics also can arise from different estimates on parameters related to duration dependence or explanatory variables.

Figures 3, 4 and 5 show the transition probabilities conditional on leaving the state for an immigrant from each country with characteristics of the standardized individual as a function of the duration. Figure 3 shows the transition probability out of self-employment. It shows that immigrants and natives have about 90% probability of finishing short spells (less than two years) of self-employment into non-employment. At elapsed durations above two years, immigrants have substantially higher probability of exit to non-employment compared to natives. After a duration of five years, natives have a 50-50 probability of exit to non-employment and wage-employment, whereas the corresponding probabilities for immigrants are 75-25 for Iranians, who come closest to the natives. The figure shows that for durations in self-employment longer than two years, the condition i) in our definition of self-employed marginalized is fulfilled for all the immigrants considered.

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[7] As latent types we choose the one of the four unobserved types with the highest probability mass.
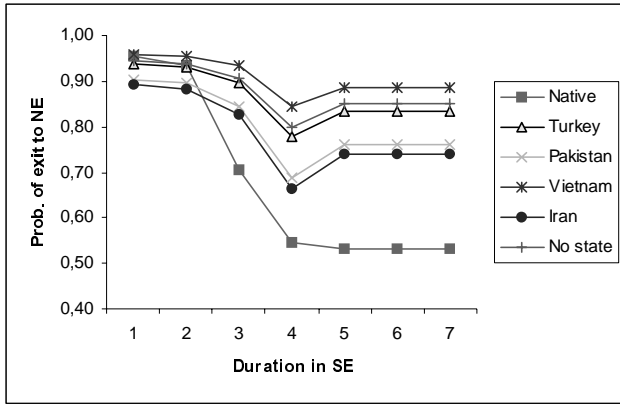
Figure 3
Transition Probabilities out of Self employment for Standardized Individuals

In Figure 4, the transition probabilities from wage-employment are shown for the standardized individuals. For both natives and immigrants, the most likely transition is to non-employment, namely with probabilities between 86% and 98%. There are, however, differences between immigrants. Turkish and Vietnamese immigrants always have higher probabilities of exiting to non-employment compared to natives, whereas the opposite is the case for Iranians and individuals with no citizenship. Since this figure illustrates condition ii) in the definition of self-employed marginalized, it is seen that Turkish and Vietnamese immigrants with characteristics of the standardized individual will fulfill condition ii) independently of the duration in wage-employment, whereas Pakistani immigrants only satisfy condition ii) for durations longer than three years.
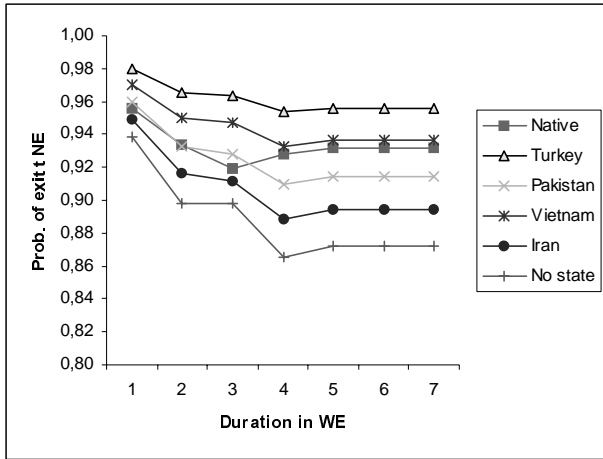
Figure 4

*Transition Probabilities out of Wage-employent for Standardized Individual*s

Finally, Figure 5 shows that immigrants always have a higher probability of becoming self-employed than the native when exiting non-employment. For the native there is about a 10% probability of an exit to self-employment and 90 percent probability to wage-employment after a spell of non-employment. The similar numbers for immigrants are a 20% exit to self-employment and a 80% exit to wage-employment. This indicates that the last condition iii) is fulfilled for all the immigrants considered. In conclusion, Figures 3 to 5 highlight that the duration dependence influences whether conditions i) to iii) hold or not.
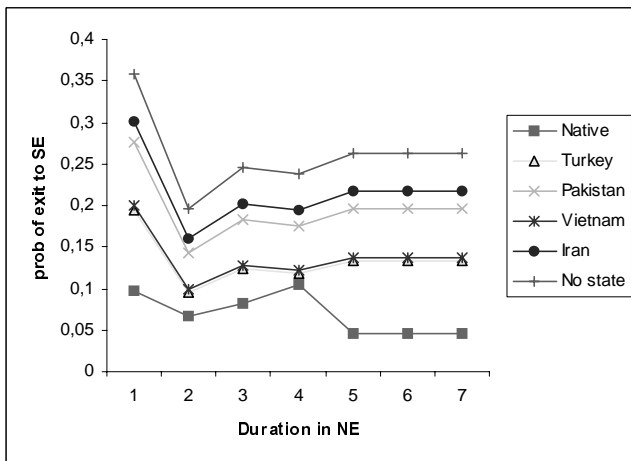

Figure 5

*Transition Probabilities out of Non-employment for Standardized Individual*s

17

The duration dependence implies that an immigrant can change his type (as defined in section II) over the duration of a spell. Below, we investigate how immigrants change type for combinations of different durations in the three states. For each country, we calculate the median characteristics over all immigrants from that country. Denote such a (non-existing) immigrant as a median immigrant. For each country, the transition probabilities are calculated for the median immigrant and compared to a native with the same characteristics as the median immigrant.

In Table 5, the differences in transition probabilities between median immigrants and natives are reported. The differences correspond to the left-hand sides of conditions i) to iii) using median immigrants and different durations. In order to characterize an individual as self-employed marginalized, the sign of the differences must be positive. Table 5 shows that condition iii) is satisfied for all median immigrants independently of the duration except for Ex-Yugoslavia with three years of duration. Also, there are substantial differences between the median immigrants even when a condition is satisfied. On the basis of the results in Table 5, one can identify the types of the immigrant groups.

Table 5

Differences in Transition Probabilities between Median Immigrants and Natives

	Lhs. of Condition (i)			Lhs. of Condition (ii)			Lhs. of Condition (iii)		
	D=1	D=3	D=5	D=1	D=3	D=5	D=1	D=3	D=5
Scandinavia	-0.143	0.079	-0.111	0.019	0.038	0.008	0.088	0.038	0.077
EC-12	-0.152	0.066	-0.125	0.016	0.032	0.004	0.059	0.020	0.054
Ex-Yugoslavia	-0.264	-0.081	-0.277	0.024	0.045	0.022	0.013	-0.009	0.022
Other DCs	-0.123	0.094	-0.089	0.004	0.011	-0.022	0.089	0.038	0.079
Turkey	-0.028	0.193	0.069	0.021	0.041	0.020	0.084	0.035	0.074
Pakistan	-0.063	0.150	-0.002	0.003	0.010	-0.019	0.152	0.083	0.125
Vietnam	0.004	0.213	0.134	0.014	0.027	0.004	0.140	0.069	0.123
Iran	-0.040	0.122	0.007	0.001	0.005	-0.023	0.265	0.166	0.234
No Citizenship	-0.006	0.155	0.081	-0.009	-0.012	-0.038	0.303	0.199	0.265
Other LDCs	-0.054	0.156	0.013	0.023	0.043	0.019	0.072	0.024	0.068

In Table 6, the inferred types are listed. The table shows that immigrants from Ex-Yugoslavia

are always Type 5 or Type 6, which indicates a stepping-stone to wage-employment or wage-employment tradition. From the table, it is seen that the duration in self-employment and wage-employment does not have an impact on the determination of types for immigrants from Ex-Yugoslavia. When duration in non-employment is 1 or 5 years, Ex-Yugoslavians are Type 5, whereas when the duration in non-employment is 3 years, they are Type 6.

For median immigrants from Scandinavia and EC-12, they are characterized as Type 5 in 2/3 of the combinations of durations. This suggests that they mainly use self-employment as a stepping-stone to wage-employment. In the remaining combinations of durations, median immigrants from Scandinavia and EC-12 are characterized as self-employed marginalized. In particular, this occurs when the duration in self-employment is three years. The same pattern is also found for other median immigrants. In general, median immigrants tend to be characterized as self-employed marginalized when the spell of self-employment is terminated after three years. One explanation for this finding could be that terminating a self-employment spell after three years coincides with the expiration of the public self-employment support.

Table 6

Types of Median Immigrants as a Function of Duration

Duration, SE	1	1	1	3	3	3	5	5	5
Duration, WE	1	3	5	1	3	5	1	3	5
Types									
Scandinavia	(5,5,5)	(5,5,5)	(5,5,5)	(1,1,1)	(1,1,1)	(1,1,1)	(5,5,5)	(5,5,5)	(5,5,5)
EC-12	(5,5,5)	(5,5,5)	(5,5,5)	(1,1,1)	(1,1,1)	(1,1,1)	(5,5,5)	(5,5,5)	(5,5,5)
Ex-Yugoslavia	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)	(5,6,5)
Other DCs	(5,5,5)	(5,5,5)	(7,7,7)	(1,1,1)	(1,1,1)	(3,3,3)	(5,5,5)	(5,5,5)	(7,7,7)
Turkey	(5,5,5)	(5,5,5)	(5,5,5)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)
Pakistan	(5,5,5)	(5,5,5)	(7,7,7)	(1,1,1)	(1,1,1)	(3,3,3)	(5,5,5)	(5,5,5)	(7,7,7)
Vietnam	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)
Iran	(5,5,5)	(5,5,5)	(7,7,7)	(1,1,1)	(1,1,1)	(3,3,3)	(1,1,1)	(1,1,1)	(3,3,3)
No Citizenship	(7,7,7)	(7,7,7)	(7,7,7)	(3,3,3)	(3,3,3)	(3,3,3)	(3,3,3)	(3,3,3)	(3,3,3)
Other LDCs	(5,5,5)	(5,5,5)	(5,5,5)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)	(1,1,1)

Note: The three types in parentheses correspond to a duration of 1, 3 and 5 years in non-employment.

The only median immigrants always characterized as self-employed marginalized are the Vietnamese. Turks and individuals from LDC are in 2/3 of the combination of durations characterized as self-employed marginalized except when they have short spells of self-employment. In this case, they are Type 5. Immigrants from other DCs, Pakistan and Iran change among Types 1,3, 5 and 7. Finally, individuals with no citizenship are characterized as Types 3 or 7, which means that their behavior is consistent with a self-employment tradition.

A comparison between the results in Table 6 and Table 4, where the identification of types is done ignoring individual characteristics, reveals large differences. When ignoring individual characteristics, most immigrants are self-employed marginalized, whereas when controlling for individual characteristics, a much more complex picture is seen. Two important implications can be inferred. First, the fact that most immigrants were characterized as self-employed marginalized was partly caused by differences in individual characteristics between immigrants and natives. Second, even when controlling for individual characteristics, the existence of self-employed marginalized among certain immigrant groups persists.

The results reported in this subsection show the existence of self-employed marginalization

for immigrants with different characteristics and durations. In the last subsection, we derive the types of the actual Danish immigrants.

C. Proportion of Self-employed Marginalized Immigrants in the Population

In this subsection we derive (macro) implications for the actual population of immigrants based on the discrete competing risks models. At a given point in time, it is possible to label each immigrant according to the 8 types. Then the fraction of self-employed marginalized among self-employed immigrants, and thus the fraction of immigrants using self-employment as a last resort, can be calculated .

To calculate the transition probabilities for an immigrant, it is necessary to choose a duration in each of the states. Typically, it is not possible to do this based on actual transition history of an immigrant. The reason is that most immigrants only experience one or two transitions in the sample period. It is possible, however, to calculate the distribution of durations for any immigrant given his characteristics. Let

$$P_{00,t}(d) = P(S_t = 0 \mid S_{t-1} = 0, x_0, d).$$

Then the probability, $P_{0,t}(d)$, of observing a duration of length d in a state 0 at time t is:

$$P_{0,t}(d) = P_{00,t-(d-1)}(1) \cdot P_{00,t-(d-2)}(2) \cdot \cdot P_{00,t-1}(d-1)(1-P_{00,t}(d)).$$

Based on the distribution of durations for each immigrant, we use the median duration in each of the three states when calculating the transition probabilities used in conditions i) to iii).

After identifying the type of an immigrant, we calculate the proportion of self-employed marginalized among all self-employed, wage-employed and non-employed immigrants in 1997. The result is shown in Table 7. The numbers show that among Turks, Pakistanis, Iranians, Vietnamese and individuals with no citizenship more than half of the self-employed are self-employed marginalized and thus using self-employment as a last resort. Among non-employed, the proportion of the self-employed marginalized type is lower and it is lowest among the wage-employed immigrants. The last column is a weighted average of the previous columns, and it shows that in total more than 50% of the immigrants from Turkey, Vietnam, Iran and individuals with no citizenship are of the self-employed marginalized type.

Table 7

The Proportion of Self-employed Marginalized in Population of Immigrants 1997

	Self-employed	Wage-employed	Non-employed	Total
	Proportion	Proportion	Proportion	Proportion
Scandinavia	0.155	0.175	0.206	0.185
EC-12	0.075	0.060	0.103	0.073
Ex-Yugoslavia	0.000	0.000	0.000	0.000
Other DCs	0.215	0.160	0.148	0.163
Turkey	0.687	0.552	0.691	0.639
Pakistan	0.434	0.350	0.332	0.361
Vietnam	0.733	0.654	0.585	0.639
Iran	0.691	0.498	0.472	0.517
No Citizenship	0.716	0.418	0.632	0.613
Other LDCs	0.425	0.234	0.304	0.284

Differences in human capital cannot explain why a large proportion of immigrants are categorized as self-employed marginalized. In Table 4, section IV, immigrants are labeled a certain type only based on country of origin. Except for immigrants from Ex-Yugoslavia and Turkey, everyone else is the self-employed marginalized type. When controlling for individual characteristics, it is seen in Table 7 that a large proportion of the population still is the self-employed marginalized type.

The identification of types is based on a comparison of transition probabilities, for instance, as stated in conditions i) to iii) for the self-employed marginalized type. Since a condition may be either satisfied or not, this led us to the eight different types. To satisfy, say, condition i), there may be a small or a large difference between the transition probabilities for the immigrant and the corresponding (non-existing) native. If the difference is small, the identification of a type is weak in the sense that a small change in the transition probability can change the type. Suppose the transition probabilities in each of the three conditions are close to those of natives. Assuming independence between transition probabilities from different states, there is about 1/8 probability of observing each type. In this light, the proportion of Scandinavians and immigrants from other DCs being self-employed marginalized is about 1/8, and thus they behave much like natives.

The robustness of our results in Table 7 is investigated by calculating the density of the

differences between transition probabilities of immigrants and their corresponding (non-existing) natives. The densities are calculated from the left-hand side of the conditions i) to iii). Figure 6 shows the densities for these left-hand sides for each country. For Vietnam, the country of origin with the highest proportion of self-employed marginalized, the density of the left-hand side in condition i) is located on the positive part of the axis. This implies that condition i) is satisfied for all Vietnamese immigrants. The left-hand sides of condition i) are quite large, for instance they are larger than 0.25 for half of the Vietnamese immigrants. In other words, a Vietnamese always has a larger probability of entering non-employment from self-employment compared to a native. For Turkey, Iran and individuals with no citizenship, which constitutes the other countries of origin with the high proportion of self-employed marginalized, a similar picture is seen.

The graph also reveals why we do not find any self-employed marginalized among Ex-Yugoslavian, since condition i) and iii) are concentrated on the negative part of the axis. For Scandinavians and other DCs, the countries with about 1/8 proportion of self-employed marginalized, the densities are concentrated about 0. The figure also reveals that there is quite some variation in the transition probabilities from self-employment to non-employment. The overall conclusion is that the determination of types for the countries with a high proportion of self-employed marginalized is robust since the densities of the differences of the left-hand sides of conditions i) to iii) are not concentrated about 0.
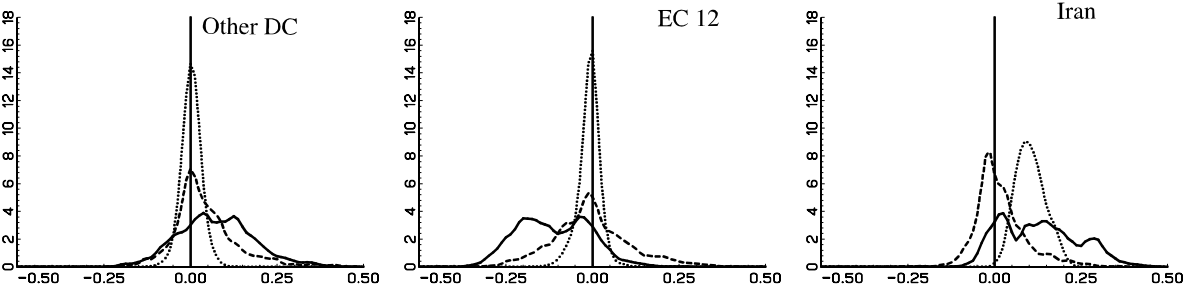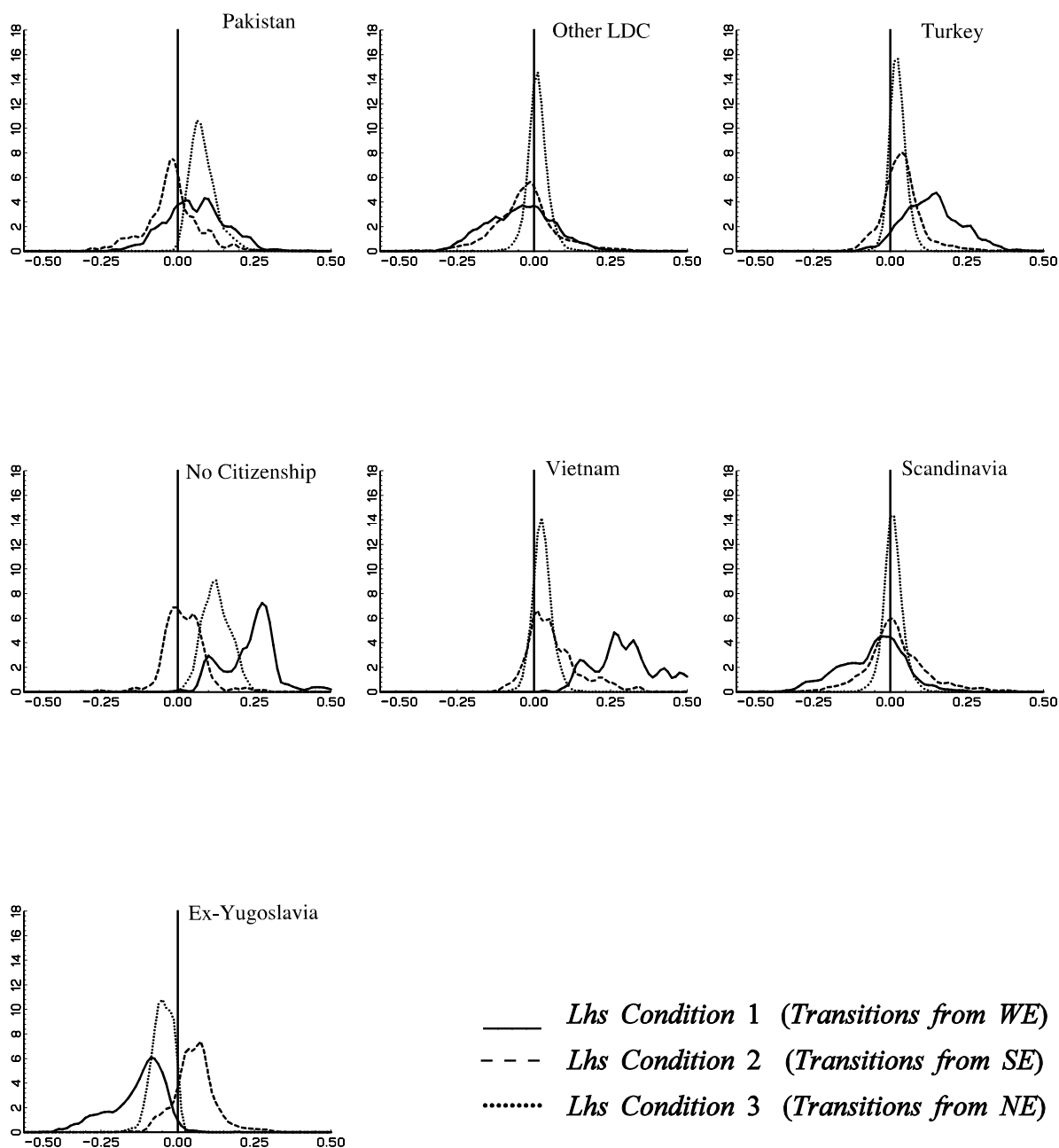
Figure 6
Distributions of Left-hand Sides in Conditions i) to iii).

VII. Conclusion

In many countries, immigrants have a high rate of self-employment. In the literature, a number of different explanations have been suggested. We have focused on a new explanation,

namely that immigrants use self-employment as a last resort. To address the validity of this explanation, we propose a method to identify self-employed marginalized by using transition probabilities between self-employment, wage-employment and non-employment.

We find evidence that self-employed marginalized exist in the Danish labor market. The empirical analysis indicates that especially many Turks, Vietnamese, Iranians and immigrants with no citizenship are self-employed marginalized. For those groups, more than half of the immigrants are characterized as self-employed marginalized and the proportion is even higher for those who currently are self-employed. This indicates that self-employment is used as a last resort.

The fact that we find self-employed marginalized among certain immigrants indicates that these immigrants may face barriers in the Danish labor market. When identifying self-employed marginalized, we control for a number of individual-specific characteristics relating to the human capital and time-invariant unobserved characteristics. Hence, the barriers arise from other unobserved characteristics (e.g. language proficiencies) or discrimination.

In this paper, we analyze marginalization in the labor market differently from earlier studies. Usually, the focus has been on the survival probability in non-employment. In contrast, we identify marginalized immigrants based on their transitions in and out of all the states. As a result, we discovered significant differences in transitions among immigrants and natives. Our method, however, also casts new light on other effects prompting self-employment. For instance, our method identifies immigrants with a self-employment tradition and immigrants who use self-employment as a stepping-stone to wage-employment. Hence, both approaches provide important insight on marginalization and, in general, the behavior of immigrants in the labor market.

We apply the method to identify types of immigrants in Denmark. For future research, it would be very interesting to apply the method for other countries to investigate the existence of self-employed marginalized. A cross-country comparison may also help to identify the barriers on the labor market, that causes immigrants to be self-employed marginalized. Although we have only used the method in this study, we believe the method can be applied in other contexts.

Appendix A

Description of the Variables

The data is register based with annual observations. Our definition of self-employment relies on two variables concerning employment status. The primary variable is a pure register-based variable and relates to the dominating employment status during the year, while the secondary variable is constructed on the basis of several other variables. Only in cases where the primary variable is missing, we use the secondary variable. If the secondary variable is also missing, we are not able to determine the state of employment which will therefore be missing. Furthermore, if a person is registered with employment other than self-employment but receives public self-employment support, we treat him as self-employed.

Table A1

Explanatory Variables

Variable name	Description	Natives		Immigrants	
		mean	*std*	mean	*std*
γ_1	Elapsed duration 1 year in the current state				
γ_2	Elapsed duration 2 years in the current state				
γ_3	Elapsed duration 3 years in the current state				
γ_4	Elapsed duration 4 years in the current state				
γ_{4+}	Elapsed duration >4 years in the current state				
Im_year_unknown:	Dummy, (1 if date of immigration missing)			0.308	*0.462*
Local U :	Local unemployment rate	0.103	*0.024*	0.102	*0.022*
Conc_immi:	Concentration of immigrants (all immigrants)			0.059	*0.035*
EC-12:	Country indicator (European Community prior to the expansion in 1997)			0.272	*0.445*
Ex-Yugoslavia:	Country indicator			0.056	*0.230*
ODC:	Country indicator (Other Developed Countries)			0.110	*0.313*
Turkey:	Country indicator			0.092	*0.289*
Pakistan:	Country indicator			0.056	*0.229*
Vietnam:	Country indicator			0.018	*0.133*
Iran:	Country indicator			0.041	*0.197*
No-state:	Country indicator (No citizenship)			0.025	*0.155*
OLDC:	Country indicator (Other Less Developed Countries)			0.177	*0.382*
Education :	Length of education in Denmark	0.111	*0.037*	0.049	*0.060*
Experience :	Labor market experience in Denmark in years	0.164	*0.077*	0.091	*0.078*
Years_U_in DK :	Years spent unemployed in Denmark			0.036	*0.045*
Single :	Dummy (1 if single)	0.237	*0.425*	0.274	*0.446*
Age_migration :	Age when immigrated to Denmark			0.342	*0.092*
Refugee :	Dummy (1 if considered a refugee)			0.184	*0.388*
DK citizen :	Dummy (1 if possess a Danish citizenship)			0.369	*0.482*
DK partner :	Dummy (1 if Danish partner)			0.353	*0.478*

Child 0-2 :	Dummy (1 if children aged 0-2 years)	0.067	*0.250*	0.127	*0.333*
Child 3-9 :	Dummy (1 if children aged 3-9 years)	0.231	*0.421*	0.308	*0.462*
Child 10-17 :	Dummy (1 if children aged 10-17 years)	0.417	*0.493*	0.390	*0.488*
Big city :	Dummy (1 if lives in a big city)	0.306	*0.461*	0.570	*0.495*
Prop. Owner :	Dummy (1 if property owner)	0.684	*0.465*	0.332	*0.471*
Indicators for the individual being entitled to Public Self-employment Support (PSS)					
PSS11 :	=1 if entitled to PPS and it is the first period of the entitlement =0 otherwise	0.035	*0.184*	0.066	*0.249*
PSS12 :	=1 if entitled to PPS apart from the first period of the entitlement (i.e. PSS11=0) =0 otherwise	0.045	*0.208*	0.130	*0.336*
Indicators for the individual NOT being entitled (including expiration within the current year) to Public Self-employment Support (PSS)					
PSS21 :	=1 if entitlement to PPS expires within the current year (conditional on being entitled in the current year, i.e. PSS11=1 or PSS12 =1). =0 otherwise	0.059	*0.236*	0.108	*0.310*
PSS22 :	=1 if entitlement to PPS expired more than 1 year ago (including never existed). =0 otherwise	0.901	*0.299*	0.782	*0.413*
Indicators for the individual being entitled to Unemployment Insurance Benefits (UIB)					
UIB11 :	=1 if entitled to UIB and it is the first period of the entitlement =0 otherwise	0.034	*0.182*	0.042	*0.202*
UIB12 :	=1 if entitled to UIB apart from the first period of the entitlement (i.e. UIB11=0) =0 otherwise	0.641	*0.480*	0.529	*0.499*
Indicators for the individual NOT being entitled (including expiration within the current year) to Unemployment Insurance Benefits (UIB)					
UIB21 :	=1 if entitlement to UIB expires within the current year (conditional on being entitled in the current year, i.e. UIB11=1 or UIB12 =1). =0 otherwise	0.023	*0.149*	0.034	*0.180*

UIB22 :	=1 if entitlement to UIB has expired within the last 3 years apart from the current year (i.e. UIB21=0). =0 otherwise	0.054	*0.226*	0.072	*0.259*
UIB23 :	=1 if entitlement to PPS expired more than 3 year ago (including never existed). =0 otherwise	0.271	*0.445*	0.357	*0.479*

Extended Explanations Regarding Some Explanatory Variables

Entitlement to unemployment insurance benefits (UIB) requires membership of an unemployment insurance fund for more than one year and at least 26 weeks of employment within the last three years.[8] Until 1993 the entitlement expired after three years, whereas after 1993 special circumstances (e.g. participation in a re-employment program) might justify UIB for up to seven years. On the basis of these rules and using information from the unemployment registers, variables concerning eligibility are constructed. The first set of variables ('UIB11' and 'UIB12') describes whether the individual is entitled to UIB. The first variable ('UIB11') describes whether the current year is the first year of the entitlement while the second variable ('UIB12') describes whether the individual has been entitled for more than 1 year. The variables 'UIB11' and 'UIB12' are mutually exclusive. The second set of variables ('UIB21', 'UIB22' and 'UIB23') describes whether entitlement to UIB has expired or never has existed. The first variable ('UIB21') describes whether the entitlement expires within the current year (conditional on being entitled within the current year) while the second variable ('UIB22') describes whether it has expired within the last 3 years apart from the current year. The last variable ('UIB23') describes whether the entitlement has expired before 3 years ago or never has prevailed. The variables 'UIB21', 'UIB22' and 'UIB23' are mutually exclusive.

During the period of consideration, different rules for public self-employment support (PSS) prevailed. Entitlement presumes UIB entitlement plus at least five months of unemployment within the last eight months. The PSS expires after approximately three years or if the labor market status changes. Along with the rules for entitlement, the rules for expiration have changed during our sample period. The first set of variables ('PSS11' and 'PSS12') describes whether the

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[8] Different rules for e.g. students and individuals on leave.

individuals are entitled to PSS. The first variable ('PSS11') describes whether the individual is entitled to PPS and whether the current year is the first year of the entitlement while the second variable ('PSS12') describes whether the individual is entitled to PPS and has been entitled for more than 1 year. The variables 'PSS11' and 'PSS12' are mutually exclusive. The second set of variables ('PSS21' and 'PSS22') describes whether entitlement to PSS has expired. The first variable ('PSS21') describes whether the entitlement expires within the current year (conditional on being entitled within the current year) while the second variable ('PSS22') describes whether the entitlement has expired before one year ago or never has existed. The variables 'PSS21' and 'PSS22' are mutually exclusive.

Appendix B

Table B1

Results from Estimation of Multinomial Models for Natives

	Transitions out of NE to		Transitions out of SE to		Transitions out of WE to	
	SE	WE	WE	NE	SE	NE
γ_1	-0.770	-1.235 **	-3.215 **	-1.312 **	0.237	-0.764 **
	0.645	0.143	0.463	0.621	0.303	0.142
γ_2	-1.029	-1.031 **	-3.637 **	-1.591 **	-0.370	-1.345 **
	0.661	0.145	0.465	0.634	0.319	0.145
γ_3	-1.353 **	-1.585 **	-3.782 **	-1.823 **	-0.495	-1.694 **
	0.681	0.157	0.466	0.641	0.331	0.150
γ_4	-1.435 **	-1.926 **	-3.862 **	-1.835 **	-0.627 *	-1.703 **
	0.688	0.170	0.465	0.647	0.340	0.156
γ_{4+}	-3.294 **	-2.912 **	-4.370 **	-2.397 **	-0.822 **	-1.838 **
	0.682	0.158	0.459	0.637	0.323	0.142
Local U	-1.228	1.843 *	4.956 **	5.772 **	-1.104	8.972 **
	2.809	0.976	1.570	1.976	1.551	0.949
Education	3.791 **	2.498 **	1.755 *	-6.265 **	-0.083	-8.888 **
	1.582	0.573	0.990	1.055	1.066	0.597
Experience	-6.462 **	0.672 *	6.535 **	1.631 **	-9.468 **	-8.680 **
	1.001	0.364	0.627	0.696	0.709	0.415
Single	-0.455 **	-0.040	0.050	0.408 **	-0.138	0.314 **
	0.166	0.058	0.101	0.116	0.106	0.054
Child 0-2	0.342	0.277 **	0.141	0.104	-0.044	-0.314 **
	0.225	0.102	0.130	0.175	0.125	0.092
Child 3-9	0.170	0.166 **	0.140 *	-0.222 *	0.057	-0.419 **
	0.165	0.068	0.080	0.121	0.082	0.061
Child 10-17	0.394 **	0.202 **	0.042	-0.092	0.119	-0.383 **
	0.148	0.058	0.072	0.103	0.075	0.051
Big city	0.175	-0.005	0.061	0.169	-0.133	-0.131 **
	0.153	0.053	0.088	0.105	0.090	0.052
Prop. Owner	0.891 **	0.119 **	-0.225 **	-0.678 **	0.569 **	-0.682 **
	0.155	0.055	0.095	0.107	0.093	0.052
PSS11	0.344 **					
	0.167					
PSS12	0.400 **					
	0.176					
PSS21			2.080 **	0.387		
			0.363	0.251		
PSS22			1.546 **	-0.903 **		
			0.337	0.208		
UIB11				-0.606 **		0.193 **
				0.213		0.090
UIB12				-0.574 **		-0.263 **
				0.097		0.051
UIB21	-0.695 **	-1.067 **				
	0.309	0.112				
UIB22	-0.184	-0.854 **				
	0.189	0.067				
UIB23	-0.298 *	-1.024 **				
	0.177	0.058				

Correction for unobserved heterogeneity[†]:

μ^1	-2.759 **	-1.787 **	-3.249 **
	0.331	0.227	0.140
μ^2	0	0.238	2.366 **
	0	0.638	0.089
π^{12}	0.912 **	0.802 **	0.145 **
	0.059	0.085	0.019
π^{10}	0.088	0.198 **	0.773 **
	0.059	0.085	0.027
π^{02}	0	0	0.001
	0	0	0.003
π^{00}	0	0	0.081 **
	0	0	0.020
N	17033	16406	88239
L(full)	-7669.1	-6274.3	-17426.8
L(const)	-8970.5	-6719.3	-18867.6
Pseudo R2	0.145	0.066	0.076

Note: ** indicates significance at a 5% level and * indicates significance at a 10% level. L(const) is the likelihood value from an estimation including a constant term only and a correcteion for unobserved heterogeneity. The Pseudo R^2 is calculated as: Pesudo R^2=1-(L(full)/L(const)).

[†] In some estimations, the full parametrization of the unobserved could not be identified. In that case, some of the parameters π and μ are restricted to 0 to achieve identification.

TABLE B2

Results from Estimation of Multinomial Models for Immigrants

	Transitions out of NE to		Transitions out of SE to		Transitions out of WE to	
	SE	WE	WE	NE	SE	NE
γ_1	-1.806 **	0.238	-1.654 **	-1.512 *	-0.295	-2.081 **
	0.358	0.170	0.572	0.774	0.458	0.211
γ_2	-1.991 **	0.775 **	-1.708 **	-1.477 *	-0.711	-2.807 **
	0.364	0.170	0.569	0.788	0.457	0.210
γ_3	-2.096 **	0.379 **	-2.174 **	-1.628 **	-0.888 *	-3.046 **
	0.371	0.174	0.573	0.794	0.471	0.209
γ_4	-2.243 **	0.280	-2.043 **	-1.965 **	-0.663	-3.078 **
	0.376	0.179	0.583	0.790	0.480	0.210
γ_{4+}	-2.643 **	-0.252	-2.628 **	-2.186 **	-1.082 **	-3.438 **
	0.370	0.177	0.575	0.793	0.464	0.204
Im_year_unkn.	0.552 **	0.171 **	-0.193	-0.234	0.622 **	0.525 **
	0.138	0.070	0.206	0.156	0.172	0.071
Local U	5.983 **	1.035	4.677 **	5.173 **	1.727	4.394 **
	1.504	0.748	2.006	1.630	1.658	0.755
Conc_immi	-7.381 **	-9.192 **	-6.229 **	-8.710 **	-7.183 **	-12.666 **
	1.286	0.618	1.824	1.495	1.718	0.692
EC-12	0.024	0.217 **	-0.286 **	-0.259 **	0.105	0.144 **
	0.133	0.059	0.136	0.131	0.120	0.055
Ex-Yugoslavia	-0.770 **	-0.114	-0.509 *	-0.904 **	-0.377 *	0.222 **
	0.245	0.087	0.294	0.350	0.229	0.081
ODC	0.174	0.217 **	-0.094	0.028	0.357 **	0.071
	0.133	0.069	0.168	0.144	0.155	0.068
Turkey	0.000	0.103	-0.703 **	0.412 **	0.361 *	1.000 **
	0.157	0.070	0.217	0.170	0.185	0.074
Pakistan	0.596 **	0.241 **	-0.164	0.499 **	1.057 **	0.982 **
	0.151	0.077	0.205	0.162	0.210	0.083
Vietnam	-0.009	0.059	-1.818 **	-0.254	0.211	0.458 **
	0.227	0.123	0.574	0.292	0.421	0.148
Iran	0.618 **	0.136	-0.875 **	-0.329	0.850 **	0.548 **
	0.140	0.090	0.320	0.210	0.280	0.121
No-state	0.341 **	-0.394 **	-1.238 **	0.015	1.233 **	0.715 **
	0.162	0.113	0.509	0.261	0.442	0.175
OLDC	0.059	0.293 **	-0.206	0.436 **	0.159	0.511 **
	0.125	0.059	0.158	0.138	0.143	0.060
Education	3.271 **	1.658 **	1.943 **	-0.299	0.083	-2.838 **
	0.647	0.348	0.877	0.751	0.819	0.359
Experience	-6.302 **	0.603 *	5.441 **	-0.976	-4.955 **	-6.365 **
	0.829	0.364	0.935	0.807	0.789	0.371
Years_U_in DK	-3.854 **	-5.192 **	-4.312 **	-1.003	1.289	4.392 **
	1.106	0.551	1.400	1.181	1.405	0.581
Single	-0.376 **	-0.050	0.114	0.176 *	0.026	0.181 **
	0.091	0.043	0.129	0.094	0.112	0.044
Age_migration	-5.557 **	-3.628 **	-1.598 *	1.305 *	-2.478 **	2.381 **
	0.704	0.339	0.963	0.778	0.789	0.342
Refugee	-0.040	0.047	-0.037	0.129	-0.620 **	-0.336 **

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	0.118	0.055	0.182	0.146	0.167	0.062
DK citizen	0.130 *	-0.066 *	-0.059	-0.008	0.002	-0.164 **
	0.078	0.039	0.102	0.082	0.093	0.040
DK partner	0.007	0.238 **	0.305 **	-0.080	-0.056	-0.383 **
	0.091	0.045	0.109	0.095	0.101	0.044
Child 0-2	0.025	0.010	-0.143	0.079	0.057	0.000
	0.087	0.047	0.136	0.100	0.111	0.049
Child 3-9	0.127 *	0.041	-0.085	-0.292 **	0.057	-0.066 *
	0.073	0.037	0.097	0.084	0.086	0.038
Child 10-17	0.159 **	0.045	-0.092	-0.238 **	0.013	-0.068 *
	0.072	0.037	0.093	0.079	0.082	0.036
Big city	0.298 **	0.335 **	0.269 **	0.344 **	0.353 **	0.517 **
	0.086	0.042	0.122	0.099	0.107	0.044
Prop. Owner	0.458 **	-0.035	0.138	-0.459 **	0.363 **	-0.546 **
	0.090	0.045	0.098	0.090	0.088	0.041
PSS11	0.730 **					
	0.090					
PSS12	0.630 **					
	0.090					
PSS21			1.535 **	1.075 **		
			0.238	0.173		
PSS22			1.003 **	0.118		
			0.218	0.155		
UIB11				-0.182		0.244 **
				0.131		0.058
UIB12				-0.491 **		0.017
				0.077		0.037
UIB21	-0.204	-0.659 **				
	0.159	0.070				
UIB22	0.052	-0.987 **				
	0.111	0.051				
UIB23	-0.173 *	-1.268 **				
	0.095	0.039				

Correction for unobserved heterogeneity[†]:

μ^1	0		-2.005 **		-3.011 **	
	0		0.204		0.158	
μ^2	0		-1.194 **		1.405 **	
	0		0.293		0.078	
π^{12}	0		0.513 *		0.380 **	
	0		0.358		0.067	
π^{10}	0		0.223		0.529 **	
	0		0.357		0.071	
π^{02}	0		0.143		0.014	
	0		0.159		0.018	
π^{00}	0		0.121		0.077 **	
	0		0.155		0.028	

N	42696		13700		62442	
L(full)	-19514.9		-6704.1		-23018.8	
L(const)	-21782.0		-7129.9		-25395.2	
Pseudo R2	0.104		0.060		0.094	

Note: ** indicates significance at a 5% level and * indicates significance at a 10% level. L(const) is the likelihood value from an estimation including a constant term only and a correcteion for unobserved heterogeneity. The Pseudo R^2 is calculated as: Pesudo R^2=1-(L(full)/L(const)).

[†] In some estimations, the full parametrization of the unobserved could not be identified. In that case, some of the parameters π and μ are restricted to 0 to achieve identification.

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