

# THE DETERMINANTS OF EAST-WEST GERMAN MIGRATION: SOME FIRST RESULTS

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Discussion Paper No. 764  
January 1993

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## ABSTRACT

### The Determinants of East-West German Migration: Some First Results\*

The determinants of migration propensities of East Germans in the German Socioeconomic Panel are investigated. The option value of waiting is proposed to capture important aspects of the migration decision. Logit analysis of migration intentions reveals that age, rents, friends and relatives in the West, and urban characteristics weigh significantly in the migration calculus. Levels and growth rates of nominal wages have little explanatory power. Some policy implications of these preliminary results are discussed.

JEL classification: J61

Keywords: migration, option value of waiting, german socioeconomic panel, Eastern Germany

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\*This paper is produced under the auspices of the CEPR research programme on *Economic Transformation in Eastern Europe*, supported by grants from the Commission of the European Communities and the Ford Foundation. Publication of this paper is supported by a grant from the Ford Foundation (no. 919-0383). It was presented at the Seventh Annual Congress of the European Economic Association, Dublin, 29-31 August 1991. The author gratefully acknowledges financial support from INSEAD, the German Marshall Fund of the United States, and from grants to CEPR by the Ford Foundation and the SPES Programme of the Commission of the European Communities (grant no. E/90100033/PRO). I thank Johannes Schwarze for invaluable help with the SOEP data. Donata Hoesch provided useful research assistance.

Submitted 17 December 1992

## NON-TECHNICAL SUMMARY

For both academic and policy-related reasons, intra-German migration is a closely monitored aspect of the European integration process. Because of common cultural ties, institutions and language, it may be viewed as an upper bound on labour mobility between the ex-communist economies of Eastern Europe and the richer market economies of the West. Neoclassical theory predicts that labour mobility should enforce rapid convergence of wages across the two regions; union agreements calling for wage parity were thought to be a rubber stamp of powerful economic forces that were operative anyway.

Yet rapid wage convergence has not occurred. Despite a few well-publicized union agreements, wages remain far apart, especially on an hourly effective earnings basis, and have not kept pace with recent price inflation in the East. Particularly in manufacturing, employers' associations are demanding renegotiation of wage contracts and even givebacks to prevent closure of some firms. At the same time, East-West German migration has slowed to a trickle -- about 2-3000 per month. What is going on? Why aren't people in the East packing their bags?

One answer might lie in the option value of waiting, as explored by Pindyck, Dixit and others. In this framework, decisions are associated with fixed costs and some constant stream of net gains in the future which evolves in a random but persistent fashion over time. Because the passage of time resolves uncertainty, the postponing of a decision can make economic sense. One common example, popularized in the trade literature, is the 'beachhead effect' -- having established, at some cost, the entry into a market, a firm may be reluctant to withdraw at the first instant the net present value of profits become negative. Looked at in this way, the migration decision constitutes an 'investment' associated with significant one-off pecuniary and non-pecuniary costs, in return for higher income. In moving, the migrant effectively extinguishes the possibility of waiting and exercising this option at some future date, i.e. not paying the fixed costs now and possibly taking advantage of better future conditions at home. In this model wage levels in the sending and receiving regions are assumed to converge probabilistically so that the expected half-life of the wage gap is finite. The option value of waiting depends on the rate of convergence of wages, the variance of the underlying uncertainty, the fixed costs of moving, and the rate of discount.

Rather than estimating the option value of waiting directly, this study simply examines correlates of migration proclivities in the German Socioeconomic Panel (SOEP), a representative sample of East German households. In 1991 a special set of questions was asked concerning migration intentions. Roughly 35% of those questioned considered migration a possible course of action, of which only 3% entertained the option 'enthusiastically'. Logit analysis reveals

that age, rent levels, friends and relatives in the West, and urban characteristics weigh significantly in the migration calculus, whereas education, region, and wages in levels and growth rates have little explanatory power.

To the extent that these intentions are actually carried out, these preliminary results have ramifications for regional evolution as well as policy. First, migrants are young people who are most likely to invest in new human capital, which is in general in short supply. The loss of these individuals will have negative effects on productivity and convergence, and possibly the return on physical investment. It will also imply a less self-sufficient East Germany, to the extent that pensions and other transfers rise faster than average productivity there. Second, rent increases currently underway in the East may cause a surge of new migration. If this migration is associated with external effects, keeping rents low (otherwise subsidizing housing renovation directly) may be good second- or third-best policy. Third, migration will affect urban areas differentially: other things equal, villages and the largest cities seem to bind their inhabitants more strongly relative to middle-size cities, which are often dominated by a single firm or industry.

## **I. Introduction**

For a number of reasons, the economic transformation of Eastern Europe has pushed international migration to the forefront of the EC economic policy agenda. Many lessons can be learned from the internal migration experience following German unification. In the period January 1989 to January 1992, roughly 870,000 East Germans (the equivalent 5% of the population or 10% of the labor force) migrated to Western Germany. While the largest flows occurred in the period preceding monetary union (July 1990), estimates of current migration are roughly 1% per year, or 2500-3000 persons per week (Schwarze and Wagner 1992). Available data suggest that the flow has stabilized at a monthly rate of 12-15,000 per month in early 1992. This is a significant figure when compared with other regions in Germany and other countries (Schwarze and Wagner 1992, Schmidt and Zimmerman 1992).

While migration is widely considered beneficial for the receiving country -- due to the positive selection of qualities necessary to succeed abroad -- the effects on the sending country or region are less clear. The celebrated "brain drain," which assumed dramatic dimensions in the 1960s, can rob sending countries of human capital necessary for development. While reverse migration may ameliorate this (for a survey see Bhagwati 1976 and references therein), reverse migrants are often close to retirement and are likely to engage primarily in consumption activities (see Djajic 1989 for theory and some evidence). Migration may therefore have negative consequences for capital formation and economic development in East Germany -- a veritable "Mezzogiorno syndrome" (Burda and Wyplosz 1992a,b). This paper examines the determinants of the migration propensities in a representative survey of East German residents. It also suggests that recent developments in the literature on the option value of waiting may yield important insights into these determinants.

## **II. Migration in Germany: Theory and Practice**

The decision to change residence is a complex one involving numerous measurable and unmeasurable factors of both economic and noneconomic nature (See Molho 1986 for a survey). Since the work

of Hicks (1932) and Roy (1953), salary differentials have traditionally received the most attention. Higher wages abroad relative to those at home should encourage migration, especially after adjusting for purchasing power in the two regions. Borjas (1991) compactly links the incentive to migrate in Roy's (1953) model to the *ex ante* distribution of individual prospects in sending and receiving countries. In particular, greater variance of potential earnings abroad and a positive correlation of earnings at home and abroad will lead to migrants of above-average quality.

Yet current earnings differentials may not adequately summarize the relevant incentives to migrate. Fixed up-front migration costs imply a role for expected future relative wages as well as an equilibrium "amortization differential" between real consumption wages in sending and receiving countries. Later analyses stressed differences of permanent income and the human capital aspects of migration (Sjaastad 1962 and Greenwood 1975). On the other hand, in some respects the migration decision is reversible and nominal wage differentials may also matter independently (see Djajic 1989 and Stark 1991).

The role of unemployment in the migration decision has been stressed since Harris and Todaro's (1970) work in the context of developing countries. The existence of unemployment (in cities for example) attenuates the information content of wage differentials, since jobs may not be readily available. Because all potential migrants are assumed identical *ex ante*, only aggregate or regional unemployment is assumed to matter.

By all these theoretical measures, intra-German migration should be significant. Despite predictions of rapid wage convergence, as of summer 1992 the effective earnings differential remains roughly 50-55%.<sup>1</sup> Relative wages in terms of consumption

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<sup>1</sup>Earnings includes various forms of nonwage compensation, including holiday pay, annual bonuses, contributions to social insurance, etc. This should be contrasted with the "headline" differential of 60-70%, which refers to contractual wages. Furthermore, this estimate does not reflect the longer workweek in the East and thus underestimates relative wages on an hourly earnings basis.

goods have diverged sharply after the freeing or increasing of key nontraded goods prices in the East.<sup>2</sup> While open joblessness in the Eastern Länder attained 14.6% in May 1992, it reaches 30-40% if short time working, temporary work schemes and retraining programs are taken into account. Some regions in East Germany face effective unemployment rates of 50% or higher.

Given these conditions, why hasn't migration occurred on a much more massive scale? (It has actually declined from 1989-90 levels.) One answer may lie in the role of uncertainty, a relatively neglected theme in the migration literature. In their study of monetary union, Akerlof et al. (1991) find that most East Germans would prefer to "wait a little" before incurring the significant up-front costs of migration. It is this "option value of waiting" that we explore in the next section.

### III. The Option Value of Waiting and the Migration Decision

The migration decision lends itself in a natural way to the "value of waiting" analysis recently reviewed by Dixit (1992a) and Pindyck (1991). Initially applied to the valuation and optimal exercise of financial options, this idea encompasses a wide range of dynamic choice problems in which the decision to be taken is characterized by (1) a fixed cost which is to some extent unrecoverable, (2) underlying uninsurable uncertainty which is revealed over time and (3) an option to wait, that is, to postpone the decision and fixed cost incurred to some later date. As Dixit and others have shown, the return to projects in such an environment must exceed by a positive margin the "Marshallian trigger" (ie the return at which the project has zero present value in expectation) before they are undertaken.

Consider the following simple model of migration in which such an option to wait (ie staying put) can have positive value. An infinitely-lived worker faces the possibility of earning wage

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<sup>2</sup> For example the price index of apartment rents in Eastern Germany rose by 286.1% in the year ending June 1992, while energy prices excluding motor fuels rose by 44.8%. As a result, the inflation rate in East Germany in 1991 (December to December) was 21.3%, compared with 3-4% in the Western half, and real wages have declined since October 1991.

$W^e$  in the east and  $W^w$  in the West with  $W^e < W^w$ . Assume further that the wage differential  $\omega_t = (W^w - W^e)/W^w$  follows the process

$$(1) \quad \Delta\omega_t = \begin{matrix} -\mu + \nu_t & \text{for } W_t^w > W_t^e \\ 0 & \text{otherwise} \end{matrix}$$

with  $E\nu_t = 0$ ,  $E\nu_t^2 = \sigma^2$ . In finite time, the wage level in the East will converge to that in the West, with expected rate of convergence given by  $\mu$ . Ignoring savings, let workers' utility over the level of wages be given by the logarithmic function  $U(\cdot) = \log W = w$ , where small letters denote natural logarithms, so  $\omega_t \cong w_t^w - w_t^e$  approximates the instantaneous utility differential between the two regions. Finally let migration costs be a fixed fraction of utility in the East,  $F$ . Under conditions of certainty ( $\nu_t = 0$  for  $t \geq 0$ ), a worker migrates when

$$(2) \quad \omega_t / (\delta + \mu) > f$$

where  $\delta$  is the discount rate. An increase in the drift term  $\mu$  (the expected rate of wage convergence) or the migration cost  $f$  increases the critical differential  $\hat{\omega} = (\delta + \mu)f$  (the "Marshallian trigger"), above which migration increases utility.

The key insight of the option of waiting literature however goes beyond these considerations. That the uncertainty in (1) shifts the support of the distribution of  $\omega$  means that waiting can increase utility, allowing the worker to profit from a negative shock without incurring the moving cost; if the realization is positive (the wage gap widens), migration is still possible.<sup>3</sup> The optimal trigger wage differential at which migration occurs (the option is exercised),  $\omega^*$ , will exceed the "Marshallian trigger"  $\hat{\omega}$ , as shown in Figure 1; the value of waiting can be read in the diagram as the difference between the curve OH and the value of the migration decision under certainty.<sup>4</sup> The value of waiting (or

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<sup>3</sup> Although result is most often couched in terms of a random walk it holds for any process with persistence; i.e. realizations of the random variable shift the entire distribution of the random variable in the same direction. See Dixit (1992b).

<sup>4</sup> When  $\omega_t$  is Brownian motion, point H will be such that the branch



the opportunity cost of exercising the option) depends positively on  $\sigma_v^2$  the variance of  $v_t$ : the greater the uncertainty, the higher the likelihood of more favorable realizations of the process.<sup>5</sup> The option value of waiting is also negatively related to the discount rate  $\delta$  and positively related to the rate of wage convergence  $\mu$ . Note that the option to migrate has positive value even when  $\omega < \hat{\omega}$ .

The "option to wait" model implies that migration can react to news without changes in observable variables. Migration as a "response to stress" (Wolpert 1966) may simply represent discrete declines in the option value of waiting due to the arrival of new information rather than "irrationality in agents' behavior" which "calls into question the fundamental principles of expected utility theory" (Molho 1986). It can also account for persistent wage differentials such that those observed in Germany.

#### IV. Data and Results

This section examines data from the German Socioeconomic Panel (SOEP), which was extended to Eastern Germany in 1990 (see Schupp and Wagner 1991 for a more complete description). While this important panel survey does not contain enough actual migrants to allow precise analysis of their behavior (26 in 1991), the second wave (spring 1991) contained a series of questions about migration intentions. Respondents were asked if they could imagine moving away from their present residence; those answering positively were asked if they could imagine moving to the western part of Germany or West Berlin. In addition, respondents were asked about friends, relatives or acquaintances in the West and the nature of the relationship to these individuals.

The distribution of respondents' answers by age and sex is shown in Table 1. It is noteworthy that roughly 35% of the survey have contemplated the migration option; while the distribution by

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OH is tangent to the line  $d/\delta + \mu$  (the "smooth-pasting" condition). In discrete time processes this will not be the case, see Dixit (1992b)

<sup>5</sup> More precisely, however, only changes in "downside risk" i.e. the variance below the trigger wage differential, affect the option value of waiting. This "bad news principle" implies an important role for the increased risk of probability of a severance in the option value.

sex seems only slightly in favor of males, age and the propensity to migrate are clearly negatively correlated. Yet, as in Akerlof et al (1991), few (3-7%) seemed to be packing their suitcases.

The SOEP data set offers several proxies for the parameters of the model of the previous section. The discount rate ( $\delta$ ) is captured to a large extent by age. Net one-time costs of migration ( $f$ ) will be influenced by the presence of relatives and friends in the host country. A spouse, presence of children in the house, or home ownership will increase costs associated with migration. Long tenure at the firm of current employment for the employed represents accumulation of firm-specific human capital which may be less valuable in West Germany. At the same time the perception of environmental quality (notably poor in East Germany) and of lifestyle in general (goods availability, neighborhood) may be important. In addition, the size of the sending community will affect the up-front cost of migration in several ways. Small towns tend to have close networks implying high costs of moving, yet offer few opportunities to those in danger of losing their jobs; larger communities will bind less, but will offer more employment alternatives and opportunities to change occupation and industry.

The wage poses an econometric problem since not all individuals are working and the decision to work may be correlated with unobservable determinants of the wage. In addition wage offers in the West cannot be observed. Ideally one would estimate the shadow wage for the unemployed using a suitable earnings equation estimated in the East, or on migrants or commuters who are working in the West, or use instrumental variables. These options are beyond the scope of this paper but are on the agenda for future research. Standard wage equation regressors were also included in the right hand side of the logistic. In addition, it is the real wages differential which matters; following the discussion of Section 2, rents were included as an explanatory variable.

Binomial logits were estimated on two samples, with the dependent variable taking the value 1 for a positive answer to the question concerning the readiness to migrate to West Germany or West Berlin. The first larger sample of 3710 individuals included all surveyed who answered the relevant questions -- including retirees, housewives and husbands, the unemployed, and those in

school or training programs (column 1). The second sample of 2219 individuals included only employed with positive gross monthly salary (columns 2 and 3). The results are presented in Table 2.

The key findings can be summarized as follows. First, age is strongly negatively associated with the desire to migrate (quadratic terms were insignificant). An extra year of age decreases the odds ratio of a positive (yes) response by 0.035-0.05. Second, current wages and recent wage growth are irrelevant, once human capital and other variables are controlled for. The third column shows that when the wage is included as an explanatory variable it enters with *positive* sign (albeit insignificantly); wages (as well as household income in column 1) are correlated with unobserved or unmeasurable ability and skills. Wage growth over the year 1990-91 did not contribute significantly to explaining migration propensities. The job tenure variable entered significantly and negatively in the logit results, just as predicted by human capital theory. Another significant predictor of migration intention was rent levels, with lower rents implying less mobility. As theory predicts, anticipated unemployment -- which shapes the option value of waiting -- is marginally significant.

Finally, urban area is statistically significant, despite the ambiguity discussed above. The effect is hump-shaped rather than monotonic. Small towns and villages seem to bind their inhabitants; larger towns and cities less so; residence in the largest cities seems to discourage migration, because of the relatively good prospects there.

#### V. Policy Implications and Conclusions

These preliminary results suggest that the age structure of those willing to migrate in the near term is skewed towards the young. If realized, this implies a future Eastern Germany which is less self-sufficient (since the pension system will become increasingly dependent on transfers from the West) and less productive (to the extent older workers invest less in human capital). Second, wage increases do not appear to affect migration desires, implying that migration costs are substantial, uncertainty about the future is high, or such increases are not

uncertainty about the future is high, or such increases are not viewed as sustainable. Third, dramatic increases in rent may imply new waves of migration. The concentration of migration intention in medium sized cities may imply a risk for the future of these important economic centers. Finally, the role of uncertainty seems to be a two edged sword: while increases in uncertainty raise the option value of waiting, risk aversion on the part of agents may encourage migration as a risk reduction measure.

At this stage in the research agenda it may be premature to stress the functional form or the specification estimated. On the other hand, we have identified several key factors in the migration decision which can be influenced by both government and trade union policy. Most important, the option value of waiting can contribute to explaining the persistence of large wage differentials across regions in the same country.

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Figure 1  
The Migration Decision and the Option of Waiting

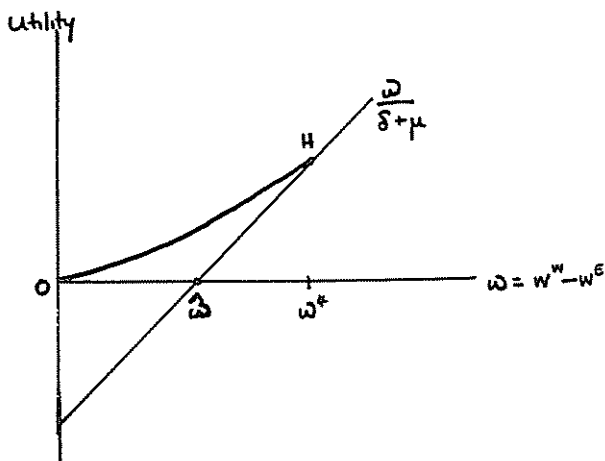


Table 1  
Migration Intention Variable in the SOEP by Group\*

Whole sample, excluding missing values and 26 already migrated  
(% of column total in parentheses)

	By Sex		By Age			TOTAL
	Male	Female	<30	30-49	≥50	
Enthusiastic	69	62	62	48	21	131
yes	(3.6)	(3.0)	(7.1)	(2.8)	(1.5)	(3.3)
Yes but it	684	630	430	679	205	1314
depends	(35.9)	(30.0)	(49.0)	(38.9)	(14.8)	(32.8)
Rather not	194	243	130	208	99	437
(10.2)	(11.6)	(14.8)	(11.9)	(7.2)	(10.9)	
Absolutely	958	1165	255	809	1059	2123
not	(50.3)	(55.5)	(29.1)	(46.4)	(76.5)	(53.0)
<b>TOTAL</b>	<b>1905</b>	<b>2100</b>	<b>877</b>	<b>1744</b>	<b>1384</b>	<b>4005</b>

\*Answer to question "Could you also imagine moving to the western part of Germany or West Berlin?" ("Können Sie sich vorstellen, von hier wegzuziehen, zum Beispiel aus familiären Gründen?"). Answers translated as follows: Enthusiastic yes = "ja gerne"; Yes but it depends = "ja, unter Umständen"; rather not = "eher nicht"; absolutely not = "nein, ausgeschlossen, kaum denkbar" and "auf keinen Fall" (the former answer is a lead-in question to the present question). Source: Socioeconomic Panel (East), wave 2.

Table 2.  
Binominal Logit Estimates for East Germans in SOEP\*  
(t-statistics in parentheses)

Variable	Larger Sample (n=3710)		Employed only (n=2219)
	(1)	(2)	(3)
Constant	1.2660 (2.77)	0.91632 (1.34)	-0.71664 (-0.61)
Age	-0.04695 (-12.24)	-0.03734 (-5.68)	-0.03924 (-5.86)
Sex	-0.29170 (-3.46)	-0.33142 (-3.11)	-0.25418 (-2.20)
Partner	-0.34687 (-2.96)	-0.30476 (-1.83)	-0.32982 (-1.98)
Children	-0.10851 (-1.19)	0.002118 (0.19)	0.003923 (0.04)
Homeowner	-0.52945 (-0.97)	-0.98430 (-1.25)	-0.97625 (-1.24)
Family in West	0.27332 (3.16)	0.23842 (2.25)	0.24087 (2.27)
Friends in West	0.52265 (6.59)	0.48683 (4.99)	0.48397 (4.95)
Commute to West	0.12866 (0.50)	0.22931 (0.84)	0.15074 (0.53)
Short-time working	0.10478 (0.80)	0.02857 (0.20)	0.05152 (0.36)
Job Tenure	-0.008943 (-1.79)	-0.014286 (-2.50)	-0.01500 (-2.62)
Civil servant	-0.23027 (-2.29)	-0.35958 (-3.19)	-0.35607 (-3.13)
Registered as unemployed	-0.17690 (-1.27)	--	--
Household income	0.0001198 (2.69)	--	--
Log Monthly Pay in 1991	--	--	0.26528 (1.71)
Change in Log Pay in 1991	--	--	-0.12656 (-0.81)
Blue collar	0.14833E-01 (0.36)	-0.14869 (-0.55)	-0.30069 (-1.07)
White collar	0.035445 (1.12)	-0.021419 (-0.08)	-0.17826 (-0.63)
Self-employed	-0.08475 (-1.18)	-0.45297 (-1.25)	-0.61186 (-1.64)

Rent	0.004168 (4.06)	0.005723 (4.20)	0.005598 (4.10)
Satisfaction with environment	-0.00081136 (-0.68)	-0.004120 (-1.53)	-0.003879 (-1.44)
Job loss certain	0.29833 (2.00)	0.27435 (1.67)	0.30812 (1.86)
Job loss possible	0.18213 (1.79)	0.16430 (1.48)	0.18521 (1.65)
City <2000 inhabitants	-0.80972 (-6.13)	-0.67931 (-4.03)	-0.65754 (-3.88)
City 2000-10000 inhabitants	-0.74714 (-5.45)	-0.52552 (-3.05)	-0.50653 (-2.93)
City 10000-100000 inhabitants	-0.21774 (-1.90)	-0.03908 (-0.28)	-0.02808 (-0.20)
Big city (Berlin/ Leipzig/Dresden)	-0.29700 (-1.72)	-0.44532 (-2.08)	-0.45796 (-2.14)
Mecklenburg-Vorpommern	0.66364E-01 (0.33)	-0.25967 (-1.04)	-0.24231 (-0.97)
Brandenburg	0.11256E-01 (0.06)	-0.28340 (-1.19)	-0.27752 (-1.17)
Sachsen-Anhalt	-0.13596 (-0.74)	-0.45545 (-2.01)	-0.43675 (-1.92)
Thüringen	-0.18586 (-0.98)	-0.45519 (-1.95)	-0.43879 (-1.87)
Sachsen	0.14115 (0.81)	-0.28119 (-1.31)	-0.26244 (-1.22)
University/ Polytechnic	0.43860E-01 (0.37)	0.14349 (0.98)	0.08600 (0.57)
Abitur	0.65132 (2.09)	0.85252 (1.50)	0.78067 (1.38)
Tenth grade	0.42366 (1.46)	0.71047 (1.29)	0.65202 (1.19)
Eighth grade	0.25305 (0.85)	0.55783 (1.01)	0.52640 (0.95)
Log likelihood	-2047.911	-1326.028	-1324.557
Chi-Squared <sup>(df)</sup>	768.9 <sup>(33)</sup>	347.6 <sup>(31)</sup>	350.5 <sup>(33)</sup>
Correctly predicted:			
No	1964/2360	1039/1315	1032/1315
Yes	677/1350	447/904	456/904

\*Dependent variable is 1 for positive response to question: could you imagine moving to Western Germany/West Berlin?; otherwise 0.