DEVELOPMENT AND DEMOGRAPHIC CHANGE IN NANG RONG, THAILAND

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ABSTRACT

Jeffrey D. Edmeades: *Development and Demographic Change in Nang Rong, Thailand.*
(Under the direction of Barbara Entwisle)

This research explores the relationship between the social and economic changes associated with the development process and demographic change in Nang Rong, a relatively poor district in Thailand's Northeast province. I focus on the ways in which the development process encourages changes in fertility and migration behavior, and how these two demographic processes are related to each other. By exploring this relationship in a context of rapid social, economic, and demographic change, and by focusing on a much finer level of analysis than is typical (individual, household, and community), this research provides a number of insights into the relationship between development and demographic behavior that may be applied in other situations of rapid change.

This dissertation is organized around three related studies. The first examines how the development process influences fertility and migration behavior, drawing on a modified version of the Multiphasic Response Theory to guide the analyses. I use a parallel modeling strategy using logistic regression techniques to explore both how fertility and migration behavior are responsive to development, and how these are related. The results lend support to the validity of the theoretical model, and suggest it may be successfully applied in other settings. The second study focuses on the ways in which

fertility behavior is influenced by migration status and lifetime experience with urban residence, focusing on both how this differs for short- and long-term migrants and for individuals at different stages of family formation. I use event history analysis to explore this issue, and specifically examine the role of migrant selectivity and the potential endogeneity of migration and fertility in shaping this relationship. The results suggest that the effect of migration in this setting is contingent on family formation stage, and is closely tied to marriage. The final study examines how the contraceptive behavior of women in Nang Rong is influenced by both past and present context, focusing on the role of community contraceptive use. The results indicate that behavior is influenced primarily by current context, but that past context continues to exert an influence on behavior through 'setting the stage' for current context.

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CHAPTER ONE: INTRODUCTION

The past fifty years have been a period of social, economic, and demographic change probably unprecedented in human history, particularly for countries in the earlier stages of the development process. This has typically involved a shift away from an organizing social and economic logic based on agricultural production, generally structured around the familial unit, to a system based increasingly on the requirements of the modern economy. This process of change is "inherently revolutionary and highly disruptive" (Massey 1988), affecting virtually all aspects of both social and economic life. This is particularly true for rural communities, where familial institutions historically have played a dominant role in shaping both economic and social behavior. The emergence of the non-familial institutions that accompany development, such as state-run educational systems and economic activities not directly organized around the family, pose a direct challenge to the role of the family as the central institution through which behavior is regulated (Axinn and Barber 2001; Axinn and Yabiku 2001; Thornton and Fricke 1987). The implications of these changes for both social and demographic behavior are a persistent theme in both sociological and demographic research, featuring in both classical and contemporary theories of population and social change. In terms of demographic change, the demographic transition theory has until recently been the primary theoretical framework explaining the effect of development on demographic

behavior. However, this dominance has been recently challenged by the emergence of a range of theories linking the changes generally associated with development to individual aspects of demographic behavior in ways not consistent with the demographic transition theory. As a result, demography currently has no dominant theoretical framework explaining this relationship, particularly within the context of the contemporary development process.

In this dissertation, I explore the relationship between the process of development and demographic change in Nang Rong, a relatively poor rural district in Thailand's Northeast province, with the aim of developing a more complete understanding of the ways in which these two processes are related to each other. In particular, I explore some of the ways in which the development process encourages change in fertility and migration behavior, and how these two demographic processes interact with each other to produce the types of changes that have come to characterize contemporary development trajectories. Within the context of this study, the development process is seen as involving a series of economic and social changes that fundamentally transform both the environment and institutions within which demographic decisions and behavior take place. In contrast with much of the research exploring the effect of the development process on demographic behavior, which has tended to focus on individual behaviors in isolation from other demographic behavior, I view these as different components of the same process of adaptation to the new social and economic environment generated by the development process. A number of related questions motivate this research. First, how does the process of development, with all of its inherently disruptive qualities, influence how people behave, particularly with regard to reproductive behavior and migration?

Secondly, to what extent do these changes represent an attempt to take advantage of the new opportunities offered by the development process and thus avoid falling behind in terms of social and economic standing? Lastly, what does this mean for our understanding of demographic change in contexts of rapid social and economic change?

Nang Rong is a particularly interesting setting in which to explore these questions, having experienced both rapid development and demographic change over the past few decades. Considered a frontier region until the middle part of the twentieth century, Nang Rong saw its population grow rapidly until the early 1970s, after which restrictions on the availability of land suitable for farming greatly reduced the in-flow of migrants. At roughly the same time, the Thai economy began a protracted period of economic growth, much of which was focused in urban areas. These changes triggered a period of significant change in Nang Rong. These included a number of important infrastructural changes, including the widespread introduction of electricity, further development of transportation networks, and the increased accessibility of both health and educational services.

This period was also one of significant social change, including a gradual increase in non-agricultural employment (Alva and Entwisle 2002), increases in age at marriage and first birth (Jampaklay 2003), and significant changes in contraceptive use levels (Chamratrithirong 1998; Entwisle et al. 1984; Entwisle et al. 1996; Entwisle et al. 1997; Knodel, Chamratrithirong and Debavalya 1987). These shifts were accompanied by extremely rapid change in terms of demographic behavior, particularly with regard to fertility and migration. As transportation networks improved and economic opportunities increased in urban areas, the Northeast became a major source of migrants to other

regions within Thailand. These migration flows involved a significant portion of the population, particularly those in younger age ranges (Alva and Entwisle 2002). This period has also seen a remarkable decline in the region's fertility, which fell from an estimated total fertility rate of over seven births per woman in the late 1960s (Knodel et al. 1987) to approximately replacement levels by the late 1990s (Chamratrithirong et al. 1997).

I take advantage of a unique dataset collected in Nang Rong between 1984 and 2000 to explore how the processes of development and population change are related in this setting[1]. These data come from a series of linked surveys administered in 51 villages[2] in 1984, 1994, and 2000. A complete census was conducted for all villages in each of the waves of data collection, with information collected on the demographic, economic and other characteristics of each individual in every household in the village, including those who were migrants at the time of the data collection. Individuals and households were tracked between waves of data collection using detailed identification information, meaning that for many individuals there is information available from all three waves of data. In the latter two waves of data collection, detailed retrospective life history information on residential, occupational, educational, and fertility experiences were collected for all individuals[3]. In addition, migrants from a subsample of 22 villages

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[1] For more information on this project, see http://www.cpc.unc.edu/projects/nangrong_home.html.

[2] The initial wave of data collection in 1984 was focused on 51 villages as defined by their administrative boundaries. As the villages increased in size over time, they split into 76 villages by 1994, and 92 by 2000. In all the analyses in this dissertation, I recombine these villages, ensuring that the village social boundaries remain consistent over the period covered by the study.

[3] In the 1994 wave of data collection, this information was gathered for all household members aged between 13 and 35, while in 2000 the ages ranged from 18 to 41.

to the most common migrant destinations were tracked and interviewed, providing both cross-sectional and life history information for current migrants. These data are used in various different combinations throughout the dissertation to explore the questions described above, using the information from each of the three waves of data collection and the life history information from both 1994 and 2000, including that gathered as a part of the migrant follow-up.

These data have a number of advantages over those used in prior research in this area. In contrast to much of the data used to explore the relationship between development and demographic change, these data provide information at the individual, household, and community levels, rather than relying solely on regional or national-level data. This allows for both a more direct application of the various theories explaining how the changes associated with the development process influence demographic behavior and for a more nuanced understanding of the ways in which this relationship operates. The longitudinal aspect of the data also represents a major advance on most data used to explore these issues, and enables the broader changes resulting from development to be closely linked to individual life experiences, particularly when used in combination with the cross-sectional data. This allows for this relationship to be explored within the framework of the life course, providing additional insights into the myriad of ways individuals both react to and are affected by the changes inherent to the development process. In addition, the prospective nature of these data, where baseline information on the entire population of these villages is available at multiple points in time, allows for the identification of an clear population at risk of experiencing any given event, including fertility and migration. This allows me to ask and examine a number of

questions that are impossible with other study designs. In addition, I am able to explore the role of selectivity, particularly in terms of migration, in greater detail than has been possible in the majority of prior research.

The dissertation is organized around three related articles, each of which examines different aspects of the relationships between development, fertility, and migration. In the first article, I apply a variation of the theory of multiphasic response originally developed by Kingsley Davis (1963) to fertility and migration behavior in Nang Rong. This theory argues that the social and economic changes inherent in the development process place increasing strain on existing social and economic institutions, including households and families, through threatening the relative social and economic status of households and individuals. The pressure generated by these strains triggers a process through which individuals are forced to select from a range of potential responses that may alleviate the strain. I apply this framework to Nang Rong, focusing on the ways in which strain at the household and community levels influence fertility and migration behavior, adopting a modeling strategy that allows me to compare the two processes side-by-side. This enables an assessment of the similarities and differences between the two potential demographic responses to strain, allowing me to draw broader conclusions about the ways in which these both represent a broad response to strain and how these processes are interrelated in this setting. I then conclude by describing how the theory of multiphasic response may act as a bridging framework between the disparate theoretical explanations for the linkages between development and demographic change, allowing for a more holistic understanding of this relationship.

The second article focuses on the ways in which experiences with migration to urban areas influence the fertility behavior of women in Nang Rong. In particular, I focus on how this may differ between short- and long-term migration, and the role of these movements within the context of the overall family formation process. I adopt an approach based explicitly on the life course framework (Elder 1977, 1983; Elder [1974] 1999) to explore this issue, which allows a more comprehensive examination of the ways in which the processes of migration and fertility are related in this context, and how these in turn may be related to the changes associated with the development process. Using the life history information of both current migrants and non-migrants in 2000, in combination with cross-sectional information gathered in both 1984 and 1994, I compare the fertility of shorter-term migrants with that of longer-term migrants. In addition, I examine the role of migrant selectivity in shaping the empirical findings, and how this is related to the theoretical relationships outlined between migration and fertility.

The final paper focuses on the role of context, both past and present, on current contraceptive behavior among women in Nang Rong, with a particular focus on the influence of the community contraceptive environment. I again adopt an explicitly life course approach to this issue, emphasizing the ways in which both past and present context intersect with individual life experiences to shape behavior. In contrast to the overwhelming majority of research in this area, which has relied primarily on cross-sectional data, I take advantage of the longititudinal nature of the data to explore how context shapes individual behavior. This allows me to take into account the potential roles of both past and present context in shaping contraceptive behavior, and to explore the ways in which this is affected by exposure to other environments through migration.

The overriding theme of each of these papers, and that of the dissertation as a whole, is how individuals respond to the social and economic changes that are associated with the transition to a social and economic organizing logic based on the modern economy. While these changes may present a range of opportunities for individuals, households, and communities in terms of economic advancement, they also create an environment where established patterns of behavior can be a hindrance to social and economic advancement. How individuals respond to this in terms of their demographic behavior, particularly fertility and migration, may play a vital role in their ability to succeed in this new environment. The following chapters each focus on different aspects of this response, treating each as part of the same overall process of adjustment to the constraints and demands imposed by the new economic and social environment. The results of the analyses in each of these chapters suggest that the effect of development on demographic behavior is complex and multi-faceted, influencing virtually every aspect of demographic behavior to some degree. I return to this in some depth in the concluding chapter, and include a discussion of the implications of these findings for both how this relationship is conceptualized and for future research in this area.

CHAPTER TWO: DEVELOPMENT AND DEMOGRAPHIC CHANGE IN NANG RONG, THAILAND: AN EXAMPLE OF A MULTIPHASIC RESPONSE?

The relationship between the social and economic changes associated with the development process and population change is a persistent theme in demographic research. Despite this, there is little consensus among demographers as to the appropriate explanatory framework for describing how development and demographic behavior are related (Bongaarts and Watkins 1996; Hirschman 1994; Mason 1997). The speed and scope of both the development process and demographic change in contemporary settings poses a number of challenges to existing theoretical frameworks describing this relationship. While demographic transition theory has formed the basis for much of the research in this area, empirical support for a number of its main propositions is mixed, particularly in contemporary settings. This has encouraged the development of a number of alternative frameworks linking development to demographic behavior, including Caldwell's theory of intergenerational wealth flows (Caldwell 1982), a number of theories based on economic explanations of behavior (e.g. for fertility: Becker 1960; Becker 1981; Easterlin 1975, 1978; Stark and Taylor 1989; for migration: Stark and Taylor 1991; Todaro 1969, 1979), theories emphasizing the role of social interaction in the 'diffusion' of information and values (Bongaarts and Watkins 1996; Montgomery and Casterline 1996), and explanations centered around cultural and ideational change (Cleland 1985; Cleland and Wilson 1987).

None of these theoretical perspectives, however, has emerged as the dominant framework explaining the relationship between development and demographic change. This is in large part because these approaches tend to be specialized in terms of the demographic outcomes they examine, such as migration or fertility, largely ignoring both the ways in which these may be related and other potential changes in demographic behavior. In addition, these perspectives tend to focus on individual facets of the development process, such as education, rarely attempting to develop a holistic approach to how the myriad changes associated with development may jointly influence a range of demographic behaviors. As a result, most are not able to provide a comprehensive account of the ways in which the changes associated with the development process may influence the entire spectrum of demographic behavior, or how these may relate to each other.

The most prominent exception to this is the theory of multiphasic response developed by Kingsley Davis (1963), which explicitly incorporates the breadth of both the changes associated with development and the potential effects these may have on demographic behavior. While this framework has become somewhat neglected by demographers (Mason 1997: 445, Footnote 6), it is ideally suited to the examination of the effects of macro-level processes, such as development, on demographic behavior at the individual or household level and resolves a number of the anomalies associated with standard demographic transition theory (Bilsborrow 1987).

In this paper, I extend the approach developed by Davis to examine the ways in which the economic and social changes associated with development shape demographic behavior at the individual level in rural Thailand, focusing on fertility and migration.

This study contributes to research in this area by examining fertility and migration within the context of a single analysis, and develops a conceptual framework based on the multiphasic response theory that explicitly addresses the relationship between development and demographic change. The results from the empirical analyses suggest that the development process itself may generate the impetus for change in multiple aspects of demographic behavior, although this is contingent on social, economic, and demographic history. I conclude with a discussion of the implications of these results for our understanding of the relationship between development and demographic change, and argue that the multiphasic response framework may resolve a number of tensions within demography as to the appropriate theoretical framework within which to explore this relationship.

Theoretical Framework

The theory of multiphasic response remains the only major theory of demographic change that both accounts for the ways in which mortality, fertility, and migration together contribute to population change and describes how this is related to macro-level change. Using data from Japan and transitional-era Europe, Davis (1963) argues that aggregate changes in demographic behavior are motivated by the desire of households and individuals to maintain or improve their relative social or economic standing in environments of demographic or economic change. Within this framework, existing behavioral patterns, both demographic and non-demographic, come under strain when macro-level changes threaten the relative socioeconomic standing of households and individuals. In contrast to most other theoretical approaches explaining demographic

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behavior, absolute levels of poverty are not seen as necessarily providing motivation for behavioral change – rather, it is the relative position of households and individuals that matters. One implication of this is that the motivation for changing demographic behavior is greatest for households and individuals whose relative social or economic status is lowest. In this sense, the multiphasic response approach differs substantially from most theories of demographic change, including the demographic transition theory and most theories emphasizing the diffusion of demographic knowledge and behavior. These approaches generally argue that demographic change takes place in the wealthiest and most educated segments of the population first, with poorer households following.

The emphasis on the relative position of households as a motivation for behavior is similar to that described by the theory of relative deprivation, which has been applied in a number of fields examining the socioeconomic determinants of social behavior, including crime (e.g. Farley 1987; Kawachi, Kennedy and Wilkinson 1999), migration (e.g. Bhandari 2004; Stark and Taylor 1989, 1991), and social movements and revolution (e.g. Boswell and Dixon 1990; Davies 1962; Tilley 1978). First conceptualized by Stouffer *et al*. (1949), the theory was further developed by Runciman (1966), who formally defined the conditions under which individuals feel relatively deprived as when: "(i) he [or she] does not have X, (ii) he sees some other person or persons (possibly including himself at some previous or future time) as having X (whether or not that is or will be in fact the case), (iii) he wants X, and (iv) he sees it as feasible that he should have X" (Runciman 1966: 10). While the application of this theory to demographic behavior is limited, a number of studies have found relative deprivation to be an

important determinant of demographic behavior, particularly migration (e.g. Bhandari 2004; Stark and Taylor 1989, 1991).

Davis argues that threats to household's relative socioeconomic status are generated primarily through the combination of high population growth rates and the emergence of an industrialized economy, both of which have the potential to erode relative socioeconomic standing. This combination creates a social and economic environment where households and individuals find "that their accustomed demographic behavior was handicapping them in their effort to take advantage of the opportunities being provided by the emerging economy" (1963: 352). Faced with a rapidly changing social and economic landscape, households and individuals are forced to adapt their behavior in order to maintain their socioeconomic position relevant to those households and individuals in their reference group. This response might involve a multitude of shifts in demographic behavior, including the postponement of marriage, increased celibacy, increased use of contraception and abortion, and emigration (1963: 351). While not addressed by Davis, households and individuals may also respond in a number of non-demographic ways, such as through the expansion of agricultural land, changes in crops grown, or increased use of technology (Bilsborrow 1987). Within this framework, responses, and the decision-making processes they involve, are not assumed to take place in isolation from each other. Rather, each potential response may influence the other, with the successful adoption of one obviating the need for further behavioral adjustments. This is most evident at the aggregate level, where the widespread adoption of a given response by other surrounding households may alleviate the strain felt by other individual

households. Alternatively, responses by individual members of households may alleviate the pressure on other household members to change their behavior.

While the original formulation of the multiphasic response theory focused primarily on the role of declining mortality rates as a source of strain in transitional societies, the approach is readily extended to incorporate other potential sources of strain (e.g. Bilsborrow 1987; Friedlander 1969, 1983). Friedlander (1983) broadens the definition of strain as "a widening gap between the current welfare of a large portion of families, or individuals, and that which could be achieved (or is aspired to) under a changed behavior, demographic or otherwise" (250). This broader application of the multiphasic response framework makes possible a consideration of a wider range of non-demographic factors that may generate strain by threatening relative socioeconomic standing, including a range of variables associated with development. The process of development, particularly in contemporary settings, has been characterized by rapid macro-level social and economic changes, many of which have the potential to generate strain at the micro-level. The scope of these changes is typically extensive, described by Massey (1988) as involving a shift from "rural, agrarian societies of small-scale institutions, stable social structures, and limited markets into urbanized, industrial societies dominated by large bureaucratic institutions, fluid social organizations, and strong integrated markets" (383-384).

The emergence of new social and economic institutions oriented away from family-based agricultural production and towards the needs of the industrial economy fundamentally changes the context within which social and economic interactions take place (Axinn and Yabiku 2001; Thornton and Fricke 1987). This generates strain on

existing social and economic arrangements within the family, and potentially weakens the influence of parents on children's behavior and lessens both the intrinsic and extrinsic benefits of having numerous children (Freedman 1979: 2). This is particularly true for the emergence of formalized systems of education, often pointed to as a key instigator of social and demographic change (Axinn and Barber 2001; Caldwell 1980, 1982). Requiring children to attend school removes them from the labor force and exposes them to new ideas and practices regarding appropriate behavior, both of which represent potential sources of strain (Friedlander 1983). In combination, these processes create an environment of social and economic uncertainty where established behavioral patterns come under increasing pressure and demographic decisions and behavior have important repercussions for social and economic success, potentially acting as vehicles for socioeconomic mobility (Greenhalgh 1988; Stark and Taylor 1989, 1991).

This pressure is intensified by a number of other features of the development process. Because the socioeconomic changes associated with development are rarely precisely synchronized, the development process often generates strain as some groups undergo change faster than others (Friedlander 1983). The resulting geographic inequalities also generate stresses in existing social and economic systems, as economic opportunities expand in some areas while simultaneously contracting in others. The effect of this is magnified by the reduction in social distance between disparate regions of the country that emerges as communication and transport networks are developed, potentially changing the frame of reference for individuals and households as to their relative status. Freedman (1979) argues that this may have the effect of shifting aspirations and expectations with regard to ideal socioeconomic status, both of which

may generate strain at the household level by highlighting the relative difference in living standards between different regions of the country (and conceivably other countries). The increased level of commodification and consumerism that typically accompanies the shift to a market oriented economy amplifies this effect, particularly in rural areas, as the socioeconomic status of households and individuals both becomes more readily identifiable and is increasingly tied to ownership of consumer goods.

The role of household and community characteristics in this framework is of critical importance, as the degree to which individuals experience strain is a feature of their socioeconomic environment. The approach taken by Davis posits that individual decisions regarding demographic behavior are influenced by household needs and aspirations, and to a certain degree reflect a broader household decision-making process. Individual responses are also likely to be influenced by the general socioeconomic environment prevalent in their communities, which act as a filter for the effects of social and economic change at the macro-level. Community characteristics may also play an important role in constraining the feasibility of adopting both demographic and non-demographic responses, either alleviating or increasing the level of strain felt by households and individuals. For example, individuals in communities with a well established non-agricultural sector will be more easily able to take advantage of the possible additional income offered by non-agricultural occupations. This does not imply that individual characteristics are not important in shaping the response to strain, or of influencing the degree to which it is experienced. The effect of individual sources of strain is likely to differ by life course and family formation stage (Friedlander, Okun and Segal 1999), both of which may place constraints on which responses are feasible at

given points in time. Rather, these decisions are seen as being influenced by the household and community environments.

Although the multiphasic response theory remains an important theoretical framework within the demographic literature, the body of research based on this approach is surprisingly small, relies almost exclusively on regional or national-level data, and has focused predominantly on population growth as a source of pressure (e.g. Bilsborrow 1987; Easterlin 1976; Friedlander 1969, 1983; Mosher 1980, 1980b; VanLandingham and Hirschman 2001). The results of these analyses suggest that the pressures created by high rates of population growth, and to a lesser extent the emergence of an industrial economy, do stimulate aggregate changes in both fertility and migration patterns and that these are interrelated in a number of ways. Friedlander (1969; 1983), using historical data from England and Wales, finds that at the aggregate level the intensity of the fertility response is contingent on the degree to which migration was adopted as a response, a result supported by Bilsborrow (1987) (but see Mosher 1980b for contradictory evidence based on Sweden). While this research provides empirical support for the relationship between strain and demographic change at the aggregate level, its reliance on macro-level data and patterns limits its ability to fully test the hypotheses generated by the multiphasic response theory. In particular, this approach does not allow a direct assessment of the role of household relative deprivation, or the threat of it, in shaping demographic outcomes. Conversely, the literature linking relative deprivation to demographic behavior is limited by its focus on individual outcomes rather than conceptualizing response as a range of interrelated behavioral changes (e.g. Bhandari 2004; Stark and Taylor 1989, 1991). Nonetheless, this literature does establish

the importance of relative deprivation as a factor in motivating demographic change in a manner that is consistent with the general expectations of the multiphasic response theory, suggesting that an empirical assessment of the role of household-level factors, particularly relative deprivation, may provide additional insights into the interaction between the processes of development and demographic change.

Study Context

The setting for this study is Nang Rong, a predominantly rural district in Thailand's Northeast region, historically the poorest in the country. As has been the case for Thailand as whole, the past five decades have been a period of dramatic social, economic, and demographic change. The intensity of change has been particularly marked since the 1980s, when the Thai export economy transitioned from being primarily based on agricultural exports to one dominated by the manufacturing sector. This precipitated a period of sustained economic growth, with the economy expanding at an average annual rate of ten percent between the mid-1980s and mid-1990s (Bello, Cunningham and Pho 1998). By 1985, the value of manufacturing exports had exceeded those of agricultural exports (Warr 1993; Warr and Nidhiprabha 1996), with the majority of economic growth taking place in Bangkok and along the more urbanized eastern seaboard, contributing to a rapid increase in inequality at the national level (Bruno, Ravallion and Squire 1996; Deolalikar 2002).

This situation was further worsened by the economic upheavals caused by the economic crisis in 1997, which erased many of the reductions in poverty levels achieved over the preceding years (Deolalikar 2002; Warr 1998). The crisis had a profound impact

on the national economy, resulting in a reduction in gross domestic product (GDP) of 0.4 percent in 1997 and 10.4 percent in 1998 (Rigg and Nattapoolwat 2001) in conjunction with an 8 percent decline in aggregate real wages between 1997 and 2000 (World Bank 2000). While the effects of the crisis were felt particularly severely in urban areas (Bello et al. 1998), rural areas also experienced increases in poverty levels, partly as a result of the curtailing of opportunities for migrants in urban areas. However, the research on the effects of the crisis on rural areas is mixed, with some studies indicating that the effects were short-term and not as severe as expected (e.g. World Bank 1999; 2000; Rigg and Nattapoolwat 2001), while others have found that the crisis had longer term consequences (Chalamwong 1998; Phongpaichit and Baker 2000).

The changes at the national level have had a dramatic effect on rural areas, including the Northeast, which has seen its economy shift from being characterized by agricultural expansion in the 1950s to be being dominated by small-scale commercial agriculture by the 1980s, culminating with the emergence of a small but significant non-agricultural sector by the end of the century. By the late 1980s, many villages in Nang Rong had electricity, and most had much improved access to major transportation networks. By the mid-1990s, all villages had electricity, a significant proportion had proportion had a primary school, and the accessibility of health services had improved markedly. While agriculture continues to dominate the region's economy, the past twenty years have seen a notable shift away from traditional employment patterns, with an increasing proportion of adults employed in non-agricultural occupations (Alva and Entwisle 2002). Partly as a consequence of this, there also have been rapid increases in the proportion of the region's residents continuing their education beyond primary

school. However, while household income in the region has increased steadily over the past twenty years, this increase has not kept pace with that of other regions in the country (Hossain 2001; Ikemoto and Uehara 2000). Despite representing only 34 percent of the Thai population, the Northeast accounted for 61 percent of Thailand's poor in 2000 (Warr and Sarntisart 2004). This was partly a residue of the effects of the economic crisis, which reduced remittances from migrants in urban areas and increased poverty levels in the region noticeably (Deolalikar 2002; Warr and Sarntisart 2004).

These changes have been accompanied by a series of remarkable shifts in demographic behavior in the region. As has been the case for Thailand as a whole, the Northeast had virtually completed the fertility transition by the end of the century, with total fertility rates falling from an estimated level of well over seven births per woman in the 1960s (Knodel, Chamratrithirong and Debavalya 1987) to 2.19 by 1989 (Hirschman et al. 1994), reaching replacement level by 1996 (Chamratrithirong et al. 1997). Contraceptive use in the region increased in conjunction with the declines in fertility, with reported levels of current use among married women of reproductive age increasing from 46 percent in 1978/1979 to over 70 percent by 1996 (Chamratrithirong 1998). Knodel et al. (1987) argue that the speed of these changes was due in large part to a significant latent demand for effective contraception brought on by the social and economic changes associated with the development process. Of these, the most important appear to have been an increase in consumer aspirations and the increased cost of having children, both of which resulted in an environment where large numbers of children were increasingly seen as burdensome. A particularly important factor in this has been the increased emphasis placed on education as a vehicle for upward mobility

following the closing of the agricultural frontier, which made improving social position via the acquisition of land less feasible.

This period has also seen a number of changes in migration patterns in the region. The closing of the agricultural frontier in the 1970s, in conjunction with the rapid growth of urban centers, resulted in the Northeast switching from being a net recipient of migrants to being characterized by high rates of out-migration, primarily to urban areas. A substantial portion of this migration flow is circular and seasonal, a pattern common throughout rural Thailand (Fuller, Lightfoot and Kamnuansilpa 1985), and involves significant portions of the population (Chamratrithirong et al. 1995; De Jong, Johnson and Richter 1996; Guest et al. 1994). Recent research in Nang Rong found that this process was extremely common for both men and women at young ages, with migration to urban areas becoming a routine practice following the completion of schooling (Alva and Entwisle 2002). As with fertility change, the motivations for migration are primarily economic, although non-economic reasons are also important. Prior research in the Northeast found that the great majority of migration movements are made for economic reasons, primarily to earn money for the household and a desire to diversify household income (De Jong et al. 1996; De Jong, Richter and Isarabhakdi 1996; Richter et al. 1997; VanWey 2003).

These changes make Nang Rong an informative setting in which to explore the relationship between development and demographic change within the multiphasic response framework. While the speed and scale of both the development process and demographic change is unusual even in the context of contemporary settings, the character of these changes is not. As is typical for rural settings throughout the world,

Nang Rong is in many ways an environment of high strain where demographic behavior has direct social and economic implications. While the increased connectivity of the district to the national and international economies has proved beneficial in a number of ways, the increased consumerism and inequality that has accompanied this has placed an even higher premium on making the 'correct' decisions in order to maintain both social and economic status, a situation common to many rural societies throughout the world.

Empirical Predictions

This section describes the general hypotheses guiding this study, with the specific expectations for the empirical effect of individual variables described in detail below. The multiphasic response theory argues that in transitional settings demographic behavior is motivated primarily by a desire to avoid the strains caused by a relative loss of economic or social status, and that these strains are in part due to the types of social and economic changes that characterize the contemporary development process. While individuals may respond in a number of ways to strain, this study focuses on the effects of strain on fertility and migration behavior. I expect both to be influenced by a variety of factors in this setting. In addition to the relative deprivation level of the household, I anticipate that individual, household, and community characteristics that threaten the relative standing of the household, either indirectly or directly, will influence both fertility and migration. While either fertility or migration may be more attractive or feasible options at different stages in the life course, or may be more effective in terms of reducing strain at given historical points in time, I expect both behaviors to be responsive to differences in levels of social and/or economic strain.

Analytical Approach

Data

The data used in this study to examine the influence of the strain related to the

development process on demographic behavior come from a series of linked surveys

conducted in Nang Rong in 1984, 1994, and 2000[4]. In each of the three waves of data

collection, information was gathered on all individuals in every household in 51 study

villages[5], in addition to a range of household and village characteristics. Households, and

the individuals within them, were tracked over time by identifying a focal individual

within the household, usually the oldest female in the previous wave of data collection,

and locating this person at subsequent time points. In addition to these data, the analyses

draw on information on women's reproductive histories gathered from ever-married

women in 2000. Together, these data provide information on both the fertility of women

between 1994 and 2000 and whether women were migrants in 2000[6]. Because the

information on women's reproductive histories was collected from ever-married women,

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[4] For more information on this project, visit http://www.cpc.unc/projects/nangrong

[5] Due to administrative subdivisions among villages over the period of the study, the number of villages increased from 51 in 1984 to 76 in 1994 and 92 by 2000. For the purposes of the analysis, split villages were recombined in order to accurately capture the social and economic environment within which individuals and households were embedded and how these change over time.

[6] This is a conservative measure of migration, and underestimates temporary flows of migration. While the role of temporary migration in relieving strain is interesting, excluding this type of migration flow from the analyses is likely to lead to an underestimation of the effects of migration rather than an overestimation. A further potential issue with this measure is that migration behavior in 2000 may be a reflection of the post-economic crisis era, and therefore be different from that of other periods. Again, this is likely to lead to an underestimation of community and household effects on migration, which could be expected to be stronger in situations where such significant macro-level period effects are not present.

never-married women are assumed to not have had any births. This is unlikely to result in any significant bias in terms of the results of the analyses, for two reasons. The first is that the definition of 'marriage' used in this study is not restricted solely to legal marriage, meaning that individuals in well-established common-law unions were also included. Secondly, the overwhelming majority of births in the Thai context take place within either legal or common-law marriage, implying a virtually universal coverage of fertility behavior.

Empirical Approach and Measures

In contrast to prior research examining either fertility or migration, the modeling strategy employed in this study is designed to enable a parallel comparison of the effects of individual, household, and community factors on both fertility and migration. In order to achieve this, I take advantage of the prospective design of the data, which allows me to identify a population that is 'at risk' of experiencing both a birth and a migration. Based on this population, I model the determinants of migration between 1994 and 2000 for 5586 women aged 12-35 in 1994 who were present in the village in 1994 and who had complete information on the variables of interest [7]. Women were considered to be migrants if the household reported them as not having lived in the household for two months or more in 2000. The model examining the determinants of fertility is based on a subsample of 3775 women present in the village in both 1994 and 2000, including the

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[7] The total number of women in this age range present in the village in 1994 and for whom it was possible to collect information in 2000 was 6027. The final number of women included in the analyses, after removing those cases with missing values on any of the variables included, was 5586 in the migration analyses and 3775 in the fertility migration.

same set of independent variables. In terms of the statistical analyses conducted in this study, this is equivalent to treating the women included in the fertility analysis as a censored sample. By comparing the effects of community and household strain on both these processes, I am able to gain some insight into the ways in which these responses are affected both similarly and differently by social circumstances and change. In order to further explore the ways in which these responses influence each other, I include in a count of the number of migrants that left the village between 1984 and 1994 in the model examining fertility, and a count of the number of births in the village over the same period in the model examining migration.

In both sets of analyses, the dependent variable is a dichotomous variable indicating whether a woman either had a birth between 1994 and 2000 or migrated out of the village over the same period. The statistical model used is a logistic regression of the form:

$$\Pr(y_i = 1 \mid x_i) = \frac{\exp(x_i\beta)}{1 + \exp(x_i\beta)} \qquad \text{(adapted from Long 1997)}$$

where $\Pr(y_i=1|x_i)$ is the probability of observing outcome 1, given the vector x_i of individual, household, and community level variables, all measured in 1994. Parameter estimates are obtained with maximum likelihood procedures, using the Huber/White/Sandwich robust estimate of variance within STATA to correct for the effect of clustering at the village level (StataCorp 2001). Because the sample used to examine fertility is restricted to only those women present in the village in 2000, the results of this analysis may be biased by the selectivities involved in the migration

process. This possibility was examined using a Heckman probit analysis for sample selectivity (Heckman 1979). The results of this indicated that the regression results were not significantly biased by sample selection[8].

The selection of the variables included in the statistical analysis was based on three criteria, including only those variables that 1) may influence the relative socioeconomic standing of households and/or individuals, either directly or indirectly; 2) have a previously established empirical relationship in the demographic literature with either fertility or migration decisions; and 3) vary sufficiently to have a demonstrated empirical impact. Table 2.1 shows the definitions and descriptive statistics for variables included in the analyses. While the characteristics of the women in each of the samples were for the most part very similar, there are some differences of note, particularly with regard to individual characteristics in 1994. As expected, the women included in the fertility analysis (which included only those present in both 1994 and 2000) were somewhat older, had on average slightly less education, and were more likely to both be married and have an agricultural occupation in 1994.

At the individual level, the variables included were those indicating life course stage (age and marital status) and the level of personal integration into the modern economy (formal education level and occupation). The relationship between the life course variables and both fertility and migration is well established in the demographic literature, while the degree of integration into the modern economy, defined as having a

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[8] This test was conducted using the svyheckprob function in Stata (Version 8). The equations for both migration and fertility were the same, with the exception of the number of individuals migrating from the village between 1984 and 1994 (included in the fertility equation) and the number of births in the village between 1984 and 1994 (included in the migration equation, which act as instruments. The atrho value was insignificant (p-value = 0.919), indicating that there was no significant selection into the sub-sample used for the fertility analysis. While the lack of strong instruments means this is a relatively weak test, this does suggest that selection effects do not dramatically influence the results of the analyses.

higher level of education and a non-agricultural occupation, is expected to reduce strain on the household by enabling greater opportunities for economic advancement in the modern economy.

The household level variables include both the demographic characteristics of the household and a range of socioeconomic variables. The demographic variables included are household size and the number of dependents in the household (defined as being aged less than 15 or over 65). I expect that larger households and those with a higher number of dependents will experience higher levels of strain, although the effect of this on fertility is somewhat ambiguous due to the fertility enhancing effects in this setting of living in multigenerational or extended households (i.e. including at least two generations of adults) (see Rindfuss et al. 1996:350 for a discussion of this in this context).

Four measures of household socioeconomic status are also included. The first is a measure of relative household wealth based on an index of household asset ownership. Households in the lower third of the wealth distribution for all households in the data were classified as poor, those in the upper 20 percent as rich, and the remainder as middle class (see Filmer and Pritchett (2001) for a description of the method used). Using the values generated by the index, I created a measure of relative deprivation, treating the other households in the village as the appropriate reference group. This follows the approach of Stark and Taylor (1989; 1991), and takes the form:

$$RD^{i} = AD(Y_{i})P(Y_{i}),$$

(Stark and Taylor 1989:3)

where Y_i represents the score of household i on the asset wealth index, $AD(Y_i)$ is the mean excess wealth score of all households with higher scores than household i, and $P(Y_i)$ represents the proportion of households in the village with scores higher than household i. Women from poorer households and with a higher degree of relative deprivation are expected to be under greater strain, and therefore be more likely to migrate and less likely to have a birth over the 1994-2000 period. A dummy variable indicating whether the household has debt is also included, with higher levels of debt expected to result in higher levels of household strain (although this may also reflect greater household entrepreneurship, which potentially may lead to lower strain in the longer term). The final household level measure included in the analyses is a dummy variable indicating whether the household owns less than one rai[9] of land (making commercial rice farming unfeasible, but has members whose primary occupation is agricultural. This variable captures the degree to which households rely on incomes generated by wage labor, with the expectation being that households that rely extensively on this source of income will be subject to greater strain.

A number of community level variables are also expected to influence the degree to which households and individuals experience strain. These include those characteristics of the community that either directly determine household strain or shape the opportunity structure for socioeconomic advancements. I include two measures of land availability, both of which act as indicators of local population pressure on land resources. The first of these is the average area of land owned by households in the village. The second is a count of the number of neighboring villages with which the

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[9] One rai is equivalent to 0.16 hectares, or 0.4 acres.

village shares accessible land, a measure of competition for agricultural land[10]. Individuals living in communities where there is greater competition with other villages for land and with smaller average land holdings are likely to experience more strain, as the potential for improving their socioeconomic position by expanding agricultural production is limited.

A similar logic motivates the inclusion of the range of socioeconomic community characteristics included in the analyses. Each of these acts as an indicator of the social and economic environment shaping the degree to which individuals and households may be able to take advantage of the opportunities offered by the 'new' economy: the percentage of adults with non-agricultural occupations; the percentage of individuals aged 13-18 in the village currently enrolled in school; the percentage of households in the village that are poor (relative to all households in the dataset), and the percentage of households with no land but with agricultural workers. The degree of change in community strain levels between 1984 and 1994 is also included in the analyses, with individuals and households in those villages that have seen a greater increase expected to be under greater levels of strain in 1994 than those where the increase in strain has been lower. In part, this is because the prospects of these villages offering improved opportunities for advancement may seem to be increasingly remote, or because this has resulted in greater levels of inequality at the village level. Finally, a count of the number of new community members under six years of age in 2000 is included in the regression equation for migration, acting as a proxy for births in the 1994-2000 period, and a count of the number of people who migrated from the village between 1994 and 2000 in the

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[10] This measure was constructed by establishing three-kilometer buffers around each village in 1994. The number of overlapping buffers was calculated for each village, resulting in the measure used in the analyses.

equation for fertility. This allows for an examination of the ways in which each of these demographic processes may influence the other. The expectation is that individuals and households in communities with higher numbers of births over this period will experience increased levels of strain as a result of increased competition for community resources, therefore increasing the likelihood of migration between 1984 and 1994. Conversely, a higher number of migrants from a community is expected to be associated with an increase in the likelihood of a birth over this period.

Results

The estimated effects of individual, household, and community variables on both fertility and migration are presented in Table 2.2. In cases where percentages are referred to in the discussion of the effects of individual variables, they have been derived by exponentiating the logistic coefficients as an aid to interpretation. As is often the case in multilevel studies, the majority of statistically significant effects are at the individual and household level, with relatively few variables at the community level having a statistically significant effect on either fertility or migration. At the individual level, both fertility and migration were influenced by life course factors in the expected ways, with age and marital status both proving important. As expected, the relationship between age and each of these processes is curvilinear, reflecting the higher 'density' of demographic activity for women in their twenties in this context. Currently married women in 1994 were more likely to have a birth and less likely to migrate between 1994 and 2000 than women who were never or previously married, reflecting the increased stability, both economically and geographically, associated with marriage in this context.

These results suggest that the degree of integration into the modern economy, measured by education and occupation, affects fertility and migration in different ways. While women with non-agricultural occupations were more likely to have a birth in the 1994-2000 period, as expected, they were also more likely to migrate, as were women with higher levels of education. These effects were considerable, with each additional year of completed formal education increasing the likelihood of migration by 14 percent (exp0.129), and women with non-agricultural occupations being 44 percent more likely to migrate than those with an agricultural occupation. There are a number of potential reasons for this. While greater integration into the modern economy may be economically beneficial and reduce strain with regard to fertility behavior, it may also enhance the benefits of migrating to urban areas where education and non-agricultural work experience are more prized, increasing the likelihood of migration. These women may also face greater pressure to take advantage of the enhanced opportunities they have in the urban sector if education and non-agricultural experience are seen as representing household investment in human capital that must be repaid at some point.

The household level variables also highlighted some of the ways in which the effect of strain differs for fertility and migration. Members of larger households were more likely to both have a birth and migrate between 1994 and 2000, reflecting both the influence of living in an extended household and the additional strain associated with supporting a larger household. As expected, the number of dependents in the household decreased the likelihood of experiencing a birth substantially and increased the likelihood of migrating, although this effect was not statistically significant in the latter case. The magnitude of the effect on fertility was substantial, with each additional dependent in the

household decreasing the likelihood of a birth by over 31 percent, reflecting the additional strain associated with caring and providing for dependents, particularly burdensome for women.

The effect of household socioeconomic standing also differed significantly between fertility and migration. As expected, the likelihood of migrating was higher for women from households who had members whose occupation was agricultural but who had insufficient land for agricultural production, although household wealth had no statistical effect[11]. However, the level of relative deprivation of the household was strongly associated with a higher likelihood of migrating between 1994 and 2000, supporting Davis's assertion that demographic behavior is responsive to relative rather than absolute differences in wealth, a finding consistent with other studies examining the role of relative deprivation in migration (Stark and Taylor 1989, 1991, 1991b). However, none of the socioeconomic indicators included in the analyses proved to be a statistically significant predictor of fertility, including the level of relative deprivation experienced by the household. Nonetheless, while not statistically significant, the direction of the coefficients for a number of these variables suggest that the likelihood of experiencing a birth is lower women from high strain households such as those with debt, land pressure, and higher levels of relative deprivation. The lack of predictive power for these variables is possibly a reflection of the stage of Nang Rong's advanced progression in the fertility transition, which may have had the effect of lessening the importance of socioeconomic variables in determining fertility behavior.

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[11] Migration was found to be responsive to household wealth in models excluding household relative deprivation level (not shown), but this effect disappeared once the household level of relative deprivation was controlled for.

As previously noted, relatively few of the community level variables had a statistically significant effect on either births or migration. Of the measures of community integratedness into the modern economy, both the percentage of teens in school and the percentage of the households in the village that were poor significantly influenced fertility and migration, with an increase of ten percent of teens in school resulting in roughly an eight percent increase in the likelihood of migrating, while an increase of ten percent of the households in the village that were poor increased this likelihood by 11 percent. The positive effect of this on migration is consistent with expectations on the effect of strain, reflecting greater preparedness of the community for the demands of the modern economy.

While the degree to which communities had experienced an increase in strain over the ten years prior to 1994 was not a statistically significant determinant of migration behavior, women from those communities that had experienced the greatest increase in strain levels were significantly less likely to have a birth than those from communities with relatively little increase in strain levels. This suggests that fertility behavior may reflect expectations for future changes in community levels of strain, which are likely to be based on assessments of past change. In a similar vein, fertility behavior was also responsive to migration patterns over the prior ten-year period, although births over the same period had no statistically significant effect on migration behavior. While the magnitude of the role of migration in shaping fertility behavior is small, the effect is significant when considering the number of migrants between 1984 and 1994. For example, the loss of the average number of migrants from a woman's community (247) results in the likelihood of a woman having a birth between 1994 and 2000 increasing by

around 25 percent relative to a woman from a village that had no migrants. While some

care must be taken in interpreting this variable, as larger communities are likely to

contribute a higher number of migrants, this does suggest that community levels of

migration play a role in shaping fertility behavior.

 While these results do suggest that strain may influence demographic behavior,

the complexity of the relationships involved and the number of coefficients estimated

make an overall assessment of this relationship difficult. In order to better illustrate the

effects of strain on both fertility and migration, I rely on simulations where those

household and community variables with a demonstrable effect on strain are manipulated

to create strain profiles representing low, medium, and high strain environments. I begin

by generating predicted probabilities for births and migration between 1994 and 2000 for

every woman included in the analyses, based on applying the coefficients from the

regression models to actual variable values, and averaging these over all women. I then

manipulate the values of selected independent household and community variables, and

repeat this process for each of the three profiles.

 The profiles generated were based on the manipulation of a number of variables at

both the household and community levels. The independent variables that are

manipulated are: household size, number of dependents in the household, household

wealth, whether the household has debt, whether the household has agricultural workers

but insufficient land for agricultural production (job strain), the level of relative

deprivation (and the squared term), the percentage of poor households in the village, the

percentage of households in the village with job strain, the average area of land owned by

households in the village, the number of overlapping village three-kilometer buffers, the

degree of increase in village strain 1984-1994, and either the number of migrants 1984-1994 or the number of births 1984-1994[12]. The resulting predicted probabilities are presented below in Figure 2.1.

These results show that both fertility and migration respond in the manner predicted by the multiphasic response theory – as the level of strain increases, the predicted probability of experiencing a birth between 1994 and 2000 declines, while the predicted probability of migrating out of the village increases. As the regression results suggest, migration is considerably more responsive to strain than births, with the predicted probability of migration increasing from 0.24 for women in low strain household and community environments to 0.51 for those in high strain environments, an increase of 0.27. The corresponding probabilities for the births are 0.38 and 0.25, a decrease of 0.13. This is not surprising, given that by 1994 fertility rates in Nang Rong were already low and further reductions would have been difficult to implement.

Discussion and Conclusions

The decline of the demographic transition theory as the dominant paradigm explaining the relationship between social, economic, and demographic change has left demography without a common theoretical framework for explaining the diversity of

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[12] The values of each individual variable used in these profiles were based on the distribution of the values of the variables. In the "Low Strain" profile, the household size, number of dependents in the household, the household level of relative deprivation, the percentage of households in the village that were poor, the percentage with job strain, the average area of land owned in the village, the number of overlapping buffers, and the number of migrants and births between 1984 and 1994 were all set at levels one standard deviation below the mean values for each, with the household debt and jobstrain variables both set to 0 and the degree of change in strain level set at "Low". A similar logic was used for the "High Strain" profile, with values set levels one standard deviation over the mean value and the household debt and jobstrain variables set to 1 and the degree of change in strain level set at "High". The "Average Strain" profile used the mean values for all variables, with the exception of the household debt and jobstrain variables, which were set at 0 and the degree of change in strain level set to "Medium".

ways in which development and population change are related. While the field has advanced a range of alternative theoretical frameworks for exploring this relationship, none of these provide the depth of explanation required to address the variety of ways in which these processes are related, either historically or contemporaneously. In some cases this is due to the fragmentary approach of these frameworks, which typically focus on individual demographic outcomes or aspects of the development process. In other cases, the empirical evidence has not supported these approaches, or they have been found to be applicable only in specific settings and contexts. In this paper, I suggest that extending the multiphasic response framework to consider sources of strain other than those directly related to population pressure may begin to fill the void left by the demographic transition theory, and explore the implications of this for fertility and migration behavior in Nang Rong, Thailand.

In contrast to prior research employing this approach, this study focuses on the micro-level implications of the interplay between development and demographic change, allowing a specific examination of the role of household relative deprivation, a central theme in the multiphasic response theory. The results of the analyses support the hypothesis that individual demographic behavior is responsive to strains of the type generated by the process of development, although there are indications that the effect of this on individual demographic responses is contingent on socioeconomic and demographic structure and history.

In the context of Nang Rong, which had experienced a sustained period of fertility decline prior to the timeframe covered by this study and where migration is extremely common, the responsiveness of fertility behavior to increased strain appears to be

somewhat less than is the case for migration. This is not surprising for a number of

reasons. In contexts of low fertility such as Nang Rong, fertility may already at the lower

end of the socially acceptable range. Previous research in Thailand suggests that a strong

two-child norm has emerged in the wake of the fertility transition (Guest 1999;

Hirschman et al. 1994), with couples unwilling to restrict their fertility further. As a

result, fertility reduction or delay is not a viable option for many women, but migration

remains an attractive option. Migration also has a number of other advantages in this

context. In particular, migration is a more flexible response to strain, in that it is quick,

temporary, and can be repeated at times of particularly high strain. However, it is clear

from these results that the strains generated by macro-level changes have the potential to

result in changes in both fertility and migration behavior at the individual level. These

changes may result in shifts in aggregate demographic patterns of the type predicted by

Davis, including a range of potential interactions between aggregate responses, many of

which are not evident when focusing on the individual level.

The design employed by this study, which is based on a two-wave panel, is not

well suited to examining the effect on demographic behavior of macro-level changes or

events such as the financial crisis that severely damaged the Thai economy between 1997

and 1999. While village characteristics capture a portion of the effect of the crisis, it is

likely that this affected all villages to a significant extent, meaning there is insufficient

variation at the village level to accurately assess whether this led to long-term changes in

fertility behavior that would bias these results. While the effects of the crisis were

particularly severe in urban areas, rural areas were also affected to a significant extent,

particularly with regard to migrant remittances. This has a number of implications for the

results from the analyses. In particular, because the only reference point for demographic behavior is measured in 2000, three years following the onset of the crisis, it may be that these reflect responses to the strains created by the economic upheavals associated with the crisis rather than the characteristics considered in the analyses. This is particularly an issue for migration, as the fertility information is based on births throughout the 1994 – 2000 period. The debate over the long-term impacts of the crisis on rural areas and the economic recovery that began in 1999 makes it difficult to determine how this may have influenced the results. However, it is likely that the primary effect of the crisis on the results of the analyses may be to increase the magnitude of the effect of a number of the variables in the analysis, therefore not invalidating the general conclusions generated by the analyses. For example, Rigg and Nattapoolwat (2001) argue that "those households and individuals most deeply embedded within the global economy who survived the economic recession best" (949) because their employment was based largely on export industries that did not suffer to the degree that other sectors of the economy did during the crisis. Poorer households, which relied more on industries more dependent on Thailand's continued growth, such as construction, were hit the hardest by the crisis. In terms of the analysis, this may have increased the importance of both relative deprivation and those variables measuring integration into the 'new' economy as a determinant of demographic behavior, both of which are consistent with the expectations generated by the multiphasic response approach.

The results of these analyses suggest that the application of the multiphasic response framework to the study of the relationship between development and behavioral change is both feasible and allows for a more holistic understanding of the mechanisms

through which this operates. The multiphasic response has a number of advantages as a

theoretical framework for the examination of the relationship between the changes

associated with the development process and population change. In contrast to the

demographic transition theory, it does not assume a monolithic pattern of development

that can be indexed by individual variables, an issue Hirschman (1994) suggests has

contributed to the decline of the demographic transition theory. Rather, the multiphasic

response approach argues that the degree to which specific aspects of the development

process influence demographic behavior through increasing levels of household and

individual strain, such the increased cost of children or increased levels of inequality, will

depend on the socioeconomic contexts within which these decisions take place. In

addition, the integrated nature of this approach allows for a more holistic assessment of

both socioeconomic stimuli and potential demographic responses. As a result, this

approach offers far greater flexibility from the perspective of the role of individual

determinants of behavior than theories that focus on individual aspects of the

development process, and provides an explanatory framework suited to a range of

different contexts. This flexibility is also evident in the degree to which the approach can

accommodate the insights of alternative theoretical approaches describing the

relationship between development and demographic change, in much the same way as the

demographic transition theory accommodated a diverse set of explanations of fertility

change. In addition to explanations based on the role of urbanization, industrialization,

and mortality in shaping demographic behavior, examples of the approaches readily

incorporated into the multiphasic response framework include approaches focusing on the

structural changes in the family (e.g. Axinn and Yabiku 2001; Caldwell 1982; Thornton

and Fricke 1987), neoclassical microeconomic factors such as the changing value of children (e.g. Becker 1960, 1981; Easterlin 1975, 1978), frameworks emphasizing the importance of the household as a decision-making unit (Stark and Taylor 1989, 1991, 1991b), and ideational theories of population change (Cleland and Wilson 1987; Montgomery and Casterline 1996). In sum, this approach provides a flexible framework relating the processes of development and behavioral change, and allows for a more comprehensive assessment of this relationship than is allowed by theoretical frameworks focusing specifically on individual aspects of this relationship.

Table 2.1: Individual, Household, and Community Determinants of Births and Migration Between 1994 and 2000: Descriptive Statistics

Variables	Variable Description	Analysis of Births		Analysis of Migration	
		Mean	S.E.	Mean	S.E.
Dependent Variable					
Birth between 1994 and 2000	Had Birth Between 1994 and 2000 (Dummy Variable)	0.352	0.478		
Migration between 1994 and 2000	Migrated between 1994 and 2000 (Dummy Variable)			0.324	0.468
Individual Level					
Age	Age in 1994	24.345	6.974	22.583	7.155
Marital Status					
Currently Married	Currently Married	0.632	0.482	0.519	0.500
Never Married	Never Married	0.347	0.476	0.460	0.498
Previously Married	Previously married, but not currently married	0.021	0.143	0.022	0.146
Education (completed years)	Completed years of formal education	5.519	2.243	5.886	2.346
Occupation					
Agricultural	Primary occupation in agricultural sector	0.776	0.417	0.695	0.460
Non-Agricultural	Primary occupation is non-agricultural	0.087	0.282	0.095	0.293
Not in Labor Force	Not currently in labor force	0.137	0.344	0.210	0.407
Household Level					
Household Size	Household size	4.880	1.651	4.993	1.710
Number of Dependents	Number of dependents (aged <15 or over 65) in household	1.923	1.197	1.953	1.233
Household SES					
Poor	Household wealth score in lowest third of distribution for all households	0.312	0.463	0.310	0.463
Middle	Household wealth score in middle third of wealth distribution	0.461	0.499	0.460	0.498
Rich	Household wealth score in upper third of wealth distribution	0.228	0.419	0.230	0.421
Household Has Debt	Household has debt; 0= Has No Debt, 1= Has Debt	0.592	0.492	0.601	0.490
Household has Jobstrain	Household has agricultural workers, but <1 rai of land; 0=No, 1=Yes	0.053	0.225	0.062	0.241
Household Relative Deprivation					
Relative Deprivation	Household relative deprivation score	0.751	0.510	0.760	0.516

Table 2.1: Individual, Household, and Community Determinants of Births and Migration Between 1994 and 2000: Descriptive Statistics (Continued)

Variables	Variable Description	Analysis of Births		Analysis of Migration	
		Mean	S.E.	Mean	S.E.
Community Level					
Percentage of Adults with Non-Agricultural Occupations	Percentage of adults in village with non-agricultural occupations	10.546	5.666	10.786	5.881
%age Teens in School	Percentage of individuals aged 13-18 currently in school	43.374	14.827	44.081	14.755
%age Households Poor	Percentage of households classified as poor	32.686	11.804	32.472	11.754
%age of Households with Jobstrain	Percentage of households in village with members whose primary occupation is agricultural, but who own less than one rai of land	16.365	6.521	16.326	6.514
Average Size of Land Holding (Rai)	Average size of household landholdings in village (in rai)	18.218	5.080	18.135	5.082
Number of Overlapping 3km Buffers	Number of neighboring villages with three-kilometer buffer that overlaps with buffer of village	23.400	7.190	23.560	7.167
Change in Strain Level					
Low	Low increase in village strain level between 1984 and 1994	0.172	0.378	0.179	0.383
Medium	Medium increase in strain level between 1984 and 1994	0.397	0.489	0.397	0.489
High	High increase in village strain level between 1984 and 1994	0.430	0.495	0.424	0.494
Multiphasic Aspect					
Number migrated	Number of individuals who migrated out of village 1984-1994	255.634	69.923		
Number births	Number of individuals added to village 1984-1994 aged less than 6			127.162	46.899
Number of Observations		3775		5586	

Table 2.2: The Effects of Individual, Household, and Community Level Strain in 1994 on Births and Migration Between 1994 and 2000 for Women Aged 12-35 in 1994: Results from a Logistic Regression.

	Births 1994-2000		Migration 1994-2000	
	Coefficient	Std. Error	Coefficient	Std. Error
Individual Level (1994)				
Age	0.397	(0.067)***	0.121	(0.047)**
Age^2	-0.010	(0.001)***	-0.004	(0.001)***
Marital Status				
Currently Married (reference)				
Never Married	-0.689	(0.138)***	0.662	(0.089)***
Previously Married	-0.097	(0.301)	0.957	(0.222)***
Education (completed years)	0.035	(0.022)	0.129	(0.018)***
Occupation				
Agricultural (reference)				
Non-Agricultural	0.269	(0.155)*	0.363	(0.127)***
Not in Labor Force	-1.095	(0.191)***	0.382	(0.093)***
Household Level				
Household Size	0.114	(0.031)***	0.097	(0.030)***
Number of Dependents	-0.373	(0.052)***	0.049	(0.042)
Household Wealth				
Poor (reference)				
Middle	-0.104	(0.131)	0.039	(0.116)
Rich	-0.285	(0.235)	0.141	(0.224)
Household Has Debt	-0.039	(0.075)	0.057	(0.072)
Household has Jobstrain	-0.170	(0.190)	0.391	(0.114)***
Household Relative Deprivation				
Relative Deprivation	-0.366	(0.316)	0.820	(0.322)**
Relative Deprivation Level^2	0.137	(0.122)	-0.199	(0.121)
Community Level				
Percentage of Adults with Non-Agricultural Occupations	-0.006	(0.010)	-0.007	(0.009)
Percentage Teens in School	0.005	(0.003)	0.008	(0.003)***
Percentage Households Poor	0.004	(0.007)	0.011	(0.005)**
Percentage of Households with Jobstrain	0.005	(0.009)	-0.009	(0.008)
Average Size of Land Holding (Rai)	0.003	(0.009)	-0.013	(0.009)
Number of Overlapping 3km Buffers	-0.002	(0.008)	-0.002	(0.006)
Increase in Strain 1984-1994				
Low				
Medium	0.010	(0.104)	-0.170	(0.144)
High	-0.196	(0.105)*	-0.173	(0.147)
Multiphasic Aspect				
Number moved out of Village 1984-1994	0.001	(0.001)*		
Number added to Village 1984-1994			0.000	(0.001)
Constant	-3.948	(0.874)***	-3.770	(0.797)***
Number of Observations	3775		5586	

Note: Standard errors in parenthesis   * p<0.1, ** p<0.05, *** p<0.001.

Figure 2.1: Simulated Predicted Probabilities of Births and Migration between 1994 and 2000 for Women Aged 12-35 in 1994.
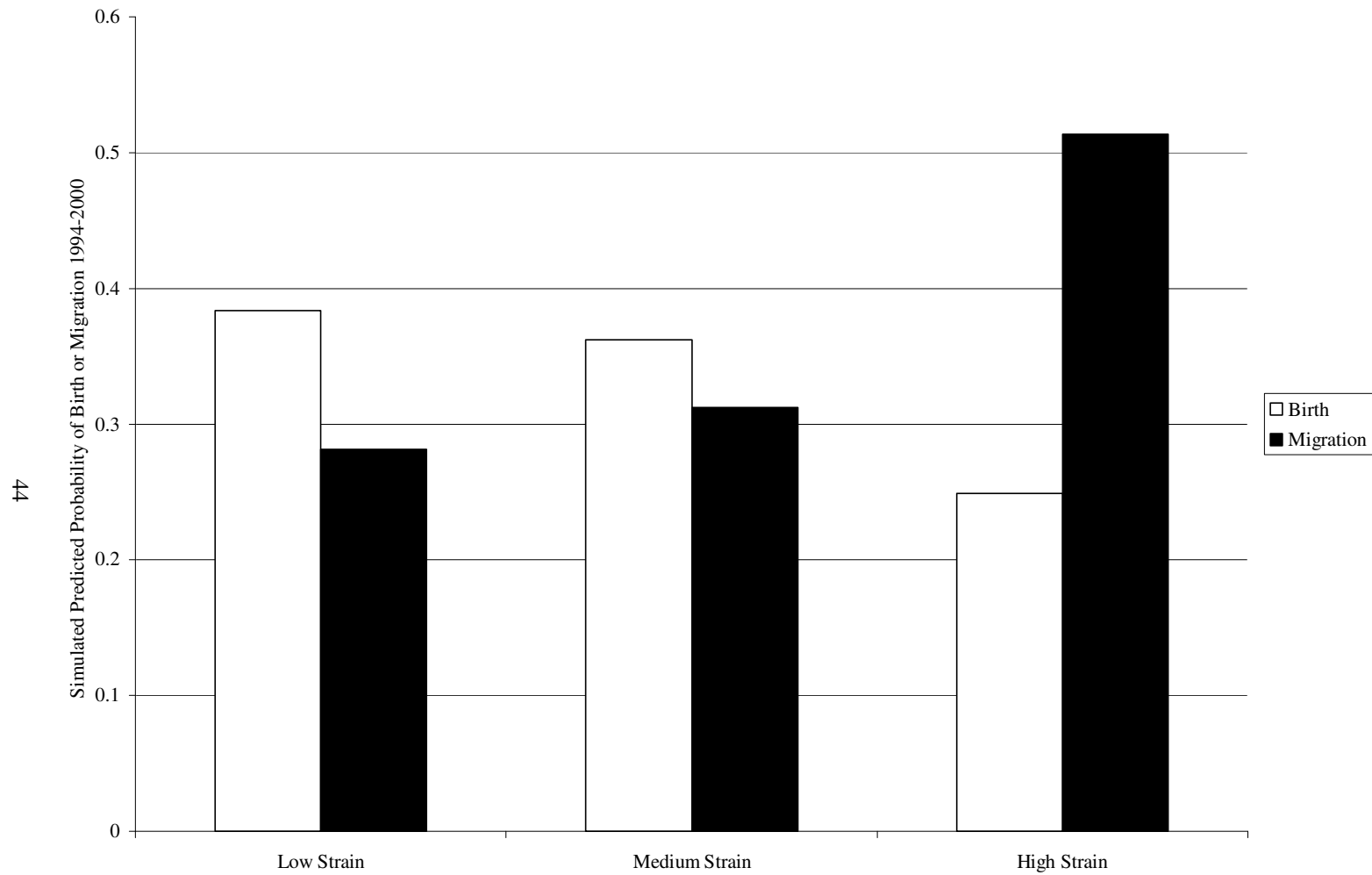
**CHAPTER THREE: RURAL-TO-URBAN MIGRATION AND FERTILITY IN
AN ENVIRONMENT OF CHANGE: EVIDENCE FROM NANG RONG,
THAILAND**

The social, economic, and demographic consequences of the sharp increases in

population mobility that have come to characterize the contemporary development

process are a persistent theme in both sociological and demographic research. While

migration has been linked to a variety of behavioral outcomes (e.g. Goldstein and

Goldstein 1981; Landale and Hauan 1996; Singley and Landale 1998; Stephen and Bean

1992), its relationship with fertility has attracted particular attention within demography.

Research in this area has found significant effects of both international and internal

migration on the fertility behavior of migrants (e.g. Goldstein, White and Goldstein 1997;

Lindstrom and Saucedo 2002; Massey and Mullan 1984; Yang 2000), while a number of

general theories of fertility change attribute a significant role to migration, particularly in

terms of the diffusion of norms and practices from urban to rural areas (e.g. Bongaarts

and Watkins 1996; Montgomery and Casterline 1996). However, researchers have only

recently begun to focus on how this relationship is influenced by both the permanence

and frequency of migration movements over the life course of individuals. The majority

of research in this area has focused on longer-term migration, despite the prevalence of

short-term migration in many parts of the world (Lindstrom and Saucedo 2002) and the

implications this has for theories explaining how migration influences fertility behavior.

In addition, much of this research is limited in its ability to fully examine the role of

origin context and migrant selectivity in shaping this relationship, leaving a number of questions about the validity of the conclusions they reach regarding the effect of migration.

This study draws on a unique longitudinal dataset to explore the ways in which rural-to-urban migration influences the fertility behavior of women from 22 villages in Nang Rong, a predominantly rural district in the Northeast province of Thailand. Nang Rong is an interesting setting in which to explore this topic, having experienced a series of dramatic social, economic, and demographic changes over the past three decades. In particular, this period has been marked by precipitous decline in fertility and sharp increases in migration to urban areas, mirroring broader changes throughout rural Thailand. The specific focus of this study is on the ways in which the relationship between migration and fertility differs depending on both the permanence and frequency of migration. I also explore how this is influenced by migrant selectivity and explore of the role of the potential endogeneity of the fertility and migration processes, leading to a more complete understanding of the interrelationships between these two processes. The data used include both detailed retrospective life history information for migrants and non-migrants and baseline information on their household and village characteristics in 1984, 1994, and 2000, allowing for a study design that is explicitly prospective in nature. This makes possible a research approach that is both consistent with the temporal expectations implicit in existing theories linking migration to fertility behavior and that is able to take into account the role of both migration experience over the life course and migrant selectivity in shaping fertility behavior.

The results of the analysis indicate that fertility behavior does differ between the different types of migration flows, but that this relationship differs according to family formation stage. While urban experience over the life course has a dampening effect on fertility, current migrant status is only an important determinant of fertility among lower parity women, implying that other factors associated with the migration process, including migrant selectivity and the role of migration in facilitating marriage may play an important role in this relationship. This suggests that in this context migration plays an important role in the process of family formation by encouraging entry into marriage, which in turn encourages earlier fertility.

Theoretical Perspectives on Migration and Fertility

The effect of migration experience on reproductive behavior is generally hypothesized to result from one or more of three processes – assimilation, adaptation, and disruption (Hervitz 1985; Lindstrom and Saucedo 2002; Singley and Landale 1998), in addition to migrant selectivity. The *assimilation* hypothesis argues that migrants slowly adopt the norms and values governing family formation and fertility behavior in the destination society (Stephen and Bean 1992). This process is gradual, with migrants continuing to be strongly influenced by the norms and values learned during socialization, and may take a number of generations to complete (Lindstrom and Saucedo 2002). The *adaptation* hypothesis argues that migrants deliberately alter their behavior in an attempt to adjust to the destination environment and fully take advantage of the returns to migration, resulting in relatively rapid changes in fertility behavior. However, this change may not reflect long-terms shifts in fertility preferences, as is argued by the

assimilation hypothesis (Lindstrom and Saucedo 2002; Rumbaut and Weeks 1986). The

disruption hypothesis focuses on how the migration experience itself interrupts normal

fertility behavior. This is usually assumed to lead to a comparatively short-term change

in behavior resulting from either spousal separation or the uncertainty associated with the

move to a new social and economic environment (Hervitz 1985; Menken 1979; Singley

and Landale 1998). A further explanation for the differences in the fertility patterns of

migrants that features prominently in the literature is that of *selectivity*. The assimilation,

adaptation, and disruption hypotheses all predict changes in fertility behavior as a direct

result of the migration experience itself. In contrast, the selectivity hypothesis argues that

differences in the observed fertility patterns of migrants and non-migrants result from the

ways in which the process of migration selects individuals on a number of social,

demographic, or psychological characteristics that are associated with higher or lower

levels of fertility (Hervitz 1985; Lindstrom and Saucedo 2002; Ribe and Schultz 1980;

Singley and Landale 1998).

The literature on migration and fertility offers mixed empirical support for each of

these hypotheses. While the assimilation approach has found support primarily in studies

of international migrant groups (e.g. Stephen and Bean 1992), there is relatively little

research exploring this approach in terms of internal migration (one exception is Hervitz

1985, who finds limited support for assimilation effects in Brazil). In contrast, there is

considerable support for the adaptation hypothesis in the literature on internal migration,

although the effect of this process on completed fertility remains unclear (for a review of

this literature, and that supporting the assimilation and selectivity hypotheses, see Kulu

2005). The effect of disruption on fertility has been demonstrated in a number of

settings, although the implications of this for completed fertility is again unclear (e.g. Goldstein and Goldstein 1983; Lindstrom and Saucedo 2002; Massey and Mullan 1984; Stephen and Bean 1992; White, Moreno and Guo 1995). While there is considerable discussion of the role of selectivity in leading to the observed differences in fertility between migrants and non-migrants (e.g. Goldstein and Goldstein 1981), relatively few studies have had the appropriate information on non-migrants in the origin communities to examine its effects on the migration estimates. The research that has been able to explore these issues has found evidence that migrants are selected on a variety of criteria, although the impact of this on the estimated effect of migration on fertility is not well established (e.g. Lindstrom and Saucedo 2002; Singley and Landale 1998; White et al. 1995).

The overwhelming majority of this research has been conducted in settings where migrants face a significantly different fertility environment in the destination than in their home communities, meaning that relatively little is known about how fertility is influenced by the migration experience when differences in fertility levels between origin and destination are relatively small, as is the case for this study. In these contexts the influence of both the processes of assimilation and adaptation are likely to be relatively small, potentially influencing the timing and spacing of fertility, rather than completed fertility. This implies that the disruption and selectivity hypotheses are likely to have the greatest effect on fertility behavior in these contexts, although their effect on completed fertility is may also be limited.

A number of recent studies have suggested that while these hypotheses provide important insights into the ways in which migration affects fertility, a more complete

understanding of the processes involved must include a more comprehensive assessment of the role of migration within the framework of the life course, particularly with regard to the process of family formation. Within this framework, the relationship between migration and fertility is dependent on life course and family formation stage, with the effect of migration on fertility differing in response to both. Singley and Landale (1998) find that the likelihood of single women migrants from Puerto Rico to the United States forming a union or experiencing a conception either inside or outside of marriage was greater than that of non-migrants, despite the overall lower fertility associated with residence in the United States. The authors attribute this to differences between the United States and Puerto Rico in terms of patterns of union formation. Andersson (2001) reaches a similar conclusion for immigrants to Sweden, arguing that migration acts as a trigger for fertility among many immigrant groups, partly because a significant portion of the immigration is tied to marriage. As Singley and Landale (1998) point out, this in part reflects an element of selectivity among migrants, as part of the effect of migration on fertility is a reflection of the dynamics of the beginning of the family formation process, which is a life course stage that is selective of particular individuals. In the case of Thailand, migration is often the result of union formation and births typically follow marriage closely (Limanonda 1992). Recent research examining rural-to-urban migration in Thailand suggests that for many women migration is closely tied to the process of family formation, with migration encouraging marriage through both exposing the migrant to a broader marriage market and through improving their economic standing (Jampaklay 2003). This suggests that the observed relationship between migration and

fertility in this context will be at least partly a reflection of the ways in which migration is related to the family formation process.

A further implication of this approach is that fertility and migration behavior at any given point, and the relationship between these, is assumed to reflect both accumulated experiences and current influences on behavior. In terms of the relationship between migration and fertility, this means that past fertility and migration behavior must be taken into account. While most research in this area does attempt to account for past fertility behavior through including current parity or the time since last birth (or marriage in the case of childless women), relatively few studies have been able to account for accumulated migration experience, with most focusing on current migration status. As a result, the literature in this area has done a relatively poor job of assessing the impact of total lifetime migrant experience on fertility behavior.

Incorporating a life course framework into the exploration of the relationship between migration and fertility has a number of implications for each of the hypotheses described above. In particular, their ability to explain this relationship is likely to vary over the life course, suggesting that at least some of the effect of migration on fertility is explained by factors that these hypotheses do not take into account. This is particularly clear when considering the ways in which both fertility and migration may be influenced by the family formation process, which itself is highly dependent on life course factors. While the linkages between fertility and the process of family formation are relatively clear, this may also influence migration behavior, particularly in situations where migration is closely tied to marriage. While this may influence the degree to which each of these hypotheses are able to explain the relationship between migration and fertility,

the effect of this is clearest for the disruption hypothesis, as migration may represent the beginning of a period of greater exposure to the risk of a birth, the opposite of the effect posited by this hypothesis. The emphasis of the life course approach on both accumulated experiences and current context also has a number of implications for these hypotheses. In particular, both the processes of assimilation and adaptation are likely to be influenced by accumulated migration and, to a lesser degree, fertility experience. This is particularly true for assimilation, as this process assumes that greater exposure to a different environment leads to gradual changes in preferences and attitudes, including those related to fertility. As a result, prior migration experience may influence the degree to which behavior is shaped by current migration status, implying that failing to take both into account may lead to misleading results when considering current migration status only.

While prior research provides a number of insights into the ways in which migration influences fertility behavior, most of these studies have relied on either cross-sectional information on migrants (Bach 1982; Goldstein 1973; Hervitz 1985), or on retrospective life history information collected in the destination location (e.g. Goldstein et al. 1997; Lindstrom and Saucedo 2002). The use of these types of data to examine the relationship between migration and fertility is problematic for a number of reasons. First, with the exception of explanations based on migrant selectivity, each of the hypotheses described above implicitly involves assumptions regarding changes in individual preferences and/or behavior over time (Singley and Landale 1998). As a result, a complete examination of the effect of migration on fertility requires longitudinal information on a number of individual level characteristics, as well as information on the

characteristics of the origin locations prior to both migration and fertility. In addition, each of these approaches assumes a clear temporal order where fertility decisions take place after migration, reinforcing the need for longitudinal data on the timing of both migration and fertility.

Second, the use of data collected only from migrants in the destination location prevents an accurate comparison of the fertility behavior of migrants with an appropriate reference group of non-migrants from their origin community. Consequently, the changes in fertility that are specifically associated with migration are confounded with the effects of residing in the destination location (Bach 1982; Singley and Landale 1998). While recent research attempts to remedy this through the inclusion of information on individuals in the origin communities in their analyses of migration and fertility (Lindstrom and Saucedo 2002; Singley and Landale 1998), the designs of most of these studies are purely retrospective, with data being collected after both fertility and migration have taken place. As a result, the reference group in the origin location may not be fully representative of the population the migrants originally came from, due to unmeasured attrition through death or migration. This prevents a complete evaluation of the role selectivity plays in the fertility behavior of migrants, as comparisons between their behavior and that of non-migrants in their origin communities are problematic. This is also true for return migration, although this is selective on both origin and destination factors.

Third, because these studies are unable to include information on the characteristics of migrant's households and communities prior to migration, they are unable to directly estimate the effect of origin context on migrant behavior. Previous

research has emphasized the importance of past context, particularly that within which socialization took place, for a number of behavioral outcomes related to fertility (Axinn, Clarkberg and Thornton 1994; Axinn and Yabiku 2001; Brewster, Billy and Grady 1993; Degraff, Bilsborrow and Guilkey 1997; Entwisle et al. 1996; Freedman 1997). This is particularly important for the assessment of the ways in which the assimilation process shapes fertility behavior, as it implies that the influence of past context on current behavior will diminish as migrants spend more time in the destination location. In addition, the lack of information on pre-migration contextual characteristics makes it impossible to assess the effect of changes in the origin community on the fertility behavior of both migrants and non-migrants. This is particularly problematic in contexts of rapid change, as is the case for many countries going through the process of development.

Fourth, relatively few of these studies have explicitly acknowledged the ways in which the processes of fertility and migration may be endogenous with respect to each other, with each potentially depending on the other. While the literature in this area has focused on the effect of migration on fertility, past fertility may also be an important determinant of migration. As a result, the estimates produced by empirical analyses may be biased, potentially resulting in misleading conclusions on the importance of migration for fertility behavior. This is particularly a problem for research relying on cross-sectional study designs, as it is typically impossible to accurately establish the temporal ordering of migration and other family formation events. This is less of an issue when longitudinal data is available and suitable lags can be introduced into the model to take

into account the temporal order implied by these hypotheses and clearly distinguish the causal relationship between the two processes.

Finally, research in this area has been focused almost exclusively on long-term permanent migration, ignoring the role that shorter-term repeated migration may play in shaping fertility behavior. In focusing on this type of migration, I hope to better understand the myriad of ways in which migration may influence fertility behavior. This is particularly important given the prevalence of this type of migration, and its importance to the process of economic and social development. In the following section, I describe the ways in which temporary migration is theorized to influence fertility behavior, and the implications this has for existing explanations of this relationship.

Temporary Migration and Fertility

The hypotheses described above are based predominantly on a conceptualization of migration as a process involving a single move followed by an extended or permanent period of exposure to the social and cultural environment of the destination location. However, the implications of migration patterns involving repeated movement between origin and location for these hypotheses remain somewhat ambiguous, and relatively unexplored in the literature. The few studies that have incorporated these patterns of migration have focused primarily on the disruptive effects of migration on fertility (Lindstrom and Saucedo 2002). Menken (1979) demonstrated mathematically the potential importance of recurrent spousal separation on fertility, while both Massey and Mullen (1984) and Lindstrom and Saucedo (2002) find that repeated migration reduces birth probabilities in the short-term. However, these studies have focused primarily on

circular movements covering a considerable period of time and typically involving traveling significant distances, both of which amplify the disruptive effect of migration on fertility. Neither is necessarily true in the case of Nang Rong, where significant portions of migration movements are seasonal, and migration destinations are relatively accessible.

Shorter-term migration also has a number of implications for the ways in which the processes of migrant assimilation, adaptation, and selectivity shape fertility behavior. Individuals entering the migration process with the intention to return to their origin village have much less incentive to change their behavior than migrants whose intention is to settle in the destination location permanently. As a result, the effect of exposure to the norms and values of the destination society on long-term fertility behavior is likely to be less important for these individuals. On the other hand, because they are aware that their stay in the destination is temporary, these migrants may be more prepared to adapt their behavior in order to fully take advantage of the economic and social opportunities provided by the destination location. If migrants adopt a pattern of circular short-term migration, this may influence the ways migrants respond to the disruptive effects of migration. While some degree of disruption is clearly an inherent part of each move, repeat migrants may be better equipped to deal with this as the result of prior experience and previously established networks that facilitate the migration process. However, the cumulative effect of repeated migration events over a migrant's reproductive life, and the disruption this entails, may result in lower completed fertility than would be the case for permanent migrants.

Selectivity issues may also influence the relationship between temporary

migration and fertility, particularly if it involves a pattern of repeated migration.

However, these are somewhat more complex than is the case for permanent migration, as

each stage of the process is subject to potential selectivity. In addition to selectivity in

the initial migration movement, those migrants who choose to return to the origin village

may also be selected on a number of criteria. The same logic applies to subsequent

migration decisions, suggesting that this group of migrants may not be a representative

subsample of the migrant population. Prior research examining the determinants of

return migration provides mixed evidence of the effect of selection processes, although

acknowledging their potential importance (Borjas and Bratsberg 1996; Lindstrom 1996;

Lindstrom and Saucedo 2002; Reagan and Olsen 2000).

Previous research in Thailand has found evidence supporting each of the four

main hypotheses explaining the effect of migration on fertility, although most of this

research took place when fertility in rural Thailand differed substantially from that in

urban areas, and is therefore of limited assistance to this paper. A number of studies

examining the fertility behavior of urban migrants have found support for the assimilation

and adaptation hypotheses, with longer-term migrants conforming closely to the fertility

patterns in the destination location, despite relatively large differences between the

fertility patterns of their origin communities and the urban areas to which they had

migrated (Goldstein 1973; Goldstein and Goldstein 1981). In addition, some support was

also found for the disruption hypothesis, with the fertility of relatively recent migrants

being considerably lower than that of either migrants or non-migrants in the destination

location (Goldstein 1973). While these studies suggest a number of interesting

differences between temporary and permanent migration in Thailand, they are limited in their ability to accurately compare migrants and non-migrants over time by their reliance on data collected from migrants in their destination locations at single points in time. In addition, the relevance of these findings to the contemporary social and demographic situation in Thailand is likely to be limited, particularly given the rapid convergence of demographic behavior between rural and urban areas over the past few decades. A number of more contemporary studies have found migration in Thailand to be highly selective on a number of criteria, including gender, age, education, marital status, and social and economic expectations (Entwisle and VanWey 2000; Guest 1996; Guest et al. 1994), suggesting that this process may play an important role in shaping the relationship between migration and fertility. However, the majority of work in this area has either been based on data collected using a retrospective design, or has not focused specifically on the implications of this for fertility behavior.

This research examines a relatively unexplored aspect of the relationship between migration and fertility in a setting of rapid social, economic, and demographic change. While there is considerable consensus in the literature that migration experiences influence fertility behavior, the role that different types of migration play in this remains unclear, particularly with regard to shorter-term migration flows, which are particularly important in this setting. Of the four explanations for the effect of migration on fertility, the disruption and selection hypotheses are expected to be particularly relevant in this context, for the reasons discussed above. While the role of selection has received considerable attention, relatively few studies have focused on the ways in which selectivity may influence the relationship between migration and fertility in the context of

shorter-term migration. This issue is particularly important given the rapid increases in

shorter-term migration that have come to characterize the development process in a wide

range of settings.

Data and Setting

The setting for this study is Nang Rong, a relatively poor, predominantly rural

district in the Northeast region of Thailand. Considered part of a broader agricultural

frontier until relatively recently, Nang Rong has undergone a series of remarkable social,

economic, and demographic changes over the past fifty years. Initially a net recipient of

migrants, by the mid-1960s Nang Rong had become a major source of migrant labor for

urban areas, with migrants being drawn by the booming economy in both Bangkok and

the cities on Thailand's eastern seaboard. Roughly at the same time, fertility rates in the

region began a dramatic decline, falling from an estimated level of well over seven births

per woman in the 1960s (Knodel, Chamratrithirong and Debavalya 1987) to 2.19 by the

end of the 1980s (Hirschman et al. 1994). Recent research has found that a strong

normative preference for two children has emerged in the wake of this exceptionally

rapid fertility transition (Guest 1999; Hirschman et al. 1994).

As was the case throughout rural Thailand, the pattern of migration to urban areas

that emerged during the 1960s was predominantly circular in nature, and involved a

significant proportion of the population (Fuller, Lightfoot and Kamnuansilpa 1985; Guest

et al. 1994). By the 1990s, the Northeast ranked second only to Bangkok in terms of

rates of migration, with 20 percent of men and 13 percent of women reporting having

recently experienced migration (Chamratrithirong et al. 1995; De Jong, Johnson and

Richter 1996; Guest 1996). At this point in time, seasonal and repeat migration movements accounted for over half of all migration in the Northeast, while making up over 35 percent of all migration within Thailand (Guest et al. 1994). While there was a brief reversal of migration patterns following the financial crisis between 1997 and 1999, which greatly reduced the employment opportunities in urban areas, migration remained an important source of income for most households in Nang Rong throughout the period covered by this study.

The data used in this study to explore the relationship between migration and fertility come from a series of three linked surveys conducted in Nang Rong in 1984, 1994, and 2000 as part of a larger project examining the interactions between social, demographic, and environmental change in Nang Rong[13]. In each of the three waves of data collection, information was collected on all households and individuals in 51 1984 study villages[14]. In the latter two waves of data collection, retrospective life history information on residential, occupational, educational, and fertility experiences were collected for all individuals. In the 1994 wave of data collection, this information was gathered for all household members aged between 13 and 35, while in 2000 the ages ranged from 18 to 41. In cases where life history information was gathered in both waves of data collection the information was combined to create a single dataset. In addition, migrants from a subsample of 22 villages to the most common migrant destinations were

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[13] For more information on this project, see http://www.cpc.unc.edu/projects/nangrong_home.html.

[14] Due to administrative subdivisions, the number of villages included in the data increased to 76 by 1994, and 92 by 2000. In order to ensure a consistent frame of reference for change at the village level, villages that had divided by either 1994 or 2000 were recombined to represent their 1984 village.

tracked and interviewed, providing life history information for current migrants[15]. In 1994, only migrants to the four most common urban destinations (Bangkok, the Eastern Seaboard, a regional city Korat, and the provincial capital Buriram) were included in the migrant follow-up, while the 2000 wave also collected information on rural-to-rural migrants. While rural-to-rural migration may influence fertility behavior in a number of ways, this study focuses on migration to urban areas, which typically involves more dramatic changes in social and economic context.

In this paper, I use the life history information to examine the predicted effects of the assimilation, adaptation, disruption, and selectivity hypotheses on the likelihood of experiencing a birth in any given year. The ages, periods, and cohorts potentially available for analysis are shown in Figure 3.1. Person-year information is available between 1972 and 2000 for all eligible individuals, and in 2001 for individuals included in the migrant follow-up. The ages of the individuals in the dataset are shown in the rows, while cohorts are represented by the diagonals running from left to right. The analysis is based on the yearly information of ever-married women aged 18-35 in the calendar years between 1994 and 2000 for whom information was collected in each of the three waves of data collection[16]. These person-years are bolded in Figure 3.1. The restriction of the analysis to this group is done for a number of reasons. The first is that this allows me to include in the analyses information on women's household and community characteristics, which was gathered only in the cross-sectional surveys. By restricting the analyses to the years between 1994 and 2000, I am able to use the

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[15] The 22 villages were selected randomly within strata generated using general location and distance from paved roads in 1984.

[16] While not included in the analysis, the information from person-years outside of this range was used for the construction of a number of time-varying variables that were included in the analysis.

information from both the 1984 and 1994 waves of data collection, providing important

information on the context within which fertility decisions are made. In addition, these

ages are particularly important for a number of demographic events of interest to this

research. In particular, women in this context begin to undertake independent migration

in their mid-to-late teens (Knodel, Chamratrithirong and Debavalya 1986; Richter et al.

1997), and have typically married by their mid twenties (Jampaklay 2003). Given the

relatively high prevalence of contraceptive use in this context (Chamratrithirong et al.

1997; Entwisle et al. 1996; Rindfuss et al. 1996), few women can be expected to continue

to have children following age 35, meaning that this age range very effectively covers the

prime reproductive stage of these women's life course. Had I opted for a cohort design, a

significant portion of the person-years available would have been excluded either because

they fell outside of the appropriate age range or because they occurred before 1984 when

there was no available information on the characteristics of their households and

communities. In addition, this design is ideally suited to the examination of the effect of

important events that have the potential to influence fertility, such as the financial crisis

that struck in 1997.

I include only ever-married women in 2000, for two reasons. The first is that this

was the only group for whom life-history information on births was collected. Secondly,

because fertility overwhelmingly takes place within marriage or its equivalent in terms of

consensual unions in Thailand (Knodel et al. 1987), I consider non-married women as not

being at risk of experiencing a birth[17]. I also restrict the sample to only those women

from the twenty-two villages that formed the basis for the migrant follow-up, allowing

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[17] The definition of marriage used in the collection of data included both legal marriages and consensual unions that the respondent considered marriages.

me to compare the characteristics of current migrants with non-migrants and return migrants. It is important to note that this does not capture the entire population of migrants, for two reasons. The first is that not all migrants were followed up, as the 2000 migrant follow-up only attempted to track migrants to a number of designated locations. The second is that not all the target migrants were successfully found and interviewed[18]. Although the analysis is based on life history data from all women, and migrant status is based on this data and not on migrant status in 2000, this is relevant to the analyses because current migrants in 2000 are probably more likely to have also been migrants during the period covered by this study. Finally, only those women for whom information was available in each of the three waves were included in the analysis. This allows me to include information on their household and community characteristics from each of the waves of data collection in the analysis, in addition to the yearly life history information.

A number of the features of these data are particularly well suited to the analysis of migration and fertility. Its prospective design permits a detailed picture of the changes taking place over time in individuals, households, and communities. This is particularly useful when comparing the behavior of migrants to non-migrants in the sending village, as the effects of broader change independent of migration can be isolated. In addition, because the characteristics of every individual in the village are known from 1984 onwards, a detailed and accurate assessment can be made of the processes through which migrant selectivity operates in this context. The collection of life history information from both individuals in the village and the migrant follow-up is particularly important

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[18] In 1994, 65% of migrants who were reported to be in one of the top four migration destinations (Korat, Buriram, the Eastern Seaboard, and Greater Metropolitan Bangkok) were located and interviewed (Rindfuss, Chattopadhyay, Kaneda, and Sethaput (Forthcoming). While response rates have not been calculated for the 2000 waves of data collection, these are expected to be comparable.

for this study, as it allows the temporal order of events in the life course to be clearly

determined. This also enables the creation of a much more detailed definition of

migration status than is possible using cross-sectional data. In particular, the availability

of yearly data on residence allows for an explicit inclusion of a time element in defining

migration status, a particularly important issue in discerning differences between short-

and long-term migration experiences. These data also make it possible to examine

repeated movements such as those involved in circular migration patterns.

A further benefit of this type of data is that it makes possible the examination of

the timing of events relative to the general life course, including those central to family

formation. This allows a more complete assessment of the ways in which the effect of

migration may differ depending on both family formation and life course stage. Finally,

the use of this data allows the study of return migration, and the role selectivity issues

play in this process. While the role of selectivity in the process of migration is well

documented, the use of solely retrospective information on migration flows has hindered

a complete assessment of the degree to which this matters for a number of behavioral

outcomes[19].

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[19] It is important to note however, that while I am able to explore the issue of selectivity to a greater extent
than is true for the overwhelming majority of studies of this type, the pool of respondents from which
information is collected is limited in a number of ways, meaning that a truly comprehensive assessment of
the role of selectivity is not possible. This is particularly true for people who were migrants in 2000, as the
study only sought to track those migrants who moved to the four target destinations. In addition, there is no
information on those migrants to target destinations but who were not located in the destination. Despite
these limitations, this study is still in a considerably better position to explore the issue of selectivity than
virtually all other studies conducted in this area.

Modeling Strategy and Variable Measurement

The primary objective of this paper is to examine the ways in which migration and fertility are related in this context, using a more refined measure of migration status that includes both short- and long-term migration flows separately. I use discrete-time event history analysis to explore these questions, taking advantage of the life history information included in the data. In order to capture any potential differences in the effect of migration on fertility between women at different stages of the family formation process, I modele the determinants of a birth for low parity women, defined as women with one child or less in any particular person-year, and higher parity women, or those with two or more children, separately. This division reflects the two-child norm prevalent in Thailand throughout the study period. This is supplemented by two additional analyses exploring the roles of migrant selectivity and endogeneity in shaping the estimated effects of migration on fertility generated by the hazard analysis. The selectivity analysis focuses on the determinants of migrant status, using logistic regression techniques to examine whether women were migrants in any given person-year. I explore the issue of endogeneity by comparing the estimates generated by a model that does not take the potential endogeneous nature of the analysis into account with those generated using a bivariate probit approach for single years. This approach allows for a general assessment of the bias that may be present in the results of the hazard analysis. Together these analyses provide further insight into the relationship between migration and fertility.

The analysis of births is based on a sample of 1715 women who met the sampling criteria described above and for whom complete information was available on each of the

variables of interest to the study[20]. The discrete-time analysis of births is based on these women, who contribute a total of 9751 person-years to the analysis. The bivariate probit analysis is based on this same sample of women, while migration analysis is based on the complete sample (i.e. this includes person-years before first marriage), which includes 10678 person-years, enabling an examination of the role of marriage in shaping migration behavior[21].

The type of longitudinal data used in this study is particularly well suited to the use of event history analyisis techniques, which allow for the inclusion of time-varying variables in addition to variables that do not change over time (Allison 1995). A key concept within the framework of life history analyses is that of spell, which in this case refers to the period of time, measured in years, between the exposure to risk of a birth and the occurrence of a birth. In the case of women who have no children at the beginning of the interval, the spell refers to the period between first marriage and first birth (or the end of the observation period), while for those with children the spell refers to the period between births. Individual women may contribute multiple spells to the analysis, or may remain in a single spell for the duration of the 1994-2000 period. 148 women contributed a single spell to the analysis (i.e. experienced a single birth), while 720 women contributed multiple spells to the analysis. 847 women did not experience a birth during

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[20] The total number of women who met the criteria for inclusion in the analysis was 1866, of whom 149 had incomplete information on one or more variables and were removed from the analysis dataset via listwise deletion (8%).

[21] These person-years include years prior to 1994 for some women, as information from these years was used in the analysis in the form of lags.

the period, and are right-censored[22]. I begin by describing the discrete time event history model, and the variables included in the analysis. This is followed by a description of the approach taken to address the issue of migrant selectivity. I then describe the bivariate probit model used to explore the role of endogeneity in shaping these results.

Discrete-time Event History Analysis

The selection of the discrete-time method of event-history analysis is appropriate for this study given that the information gathered via the life history calendar was collected on a yearly basis, meaning that the exact timing of events is unknown. The dependent variable in the fertility analysis is a dichotomous variable indicating whether a birth took place in that person-year or not. The independent variables, measured in each person-year, include information on the characteristics of the woman, her household, and the origin community, and are time-varying. The estimation is based on the logistic specification of the discrete-time event history model, where a logistic regression model is applied to dataset of pooled individual person-years (Allison 1995). The regression equation is:

$$\log\left(\frac{P_{it}}{1-P_{it}}\right) = \alpha_t + \beta_1 X_{i1} + ... + \beta_k x_{ik} \tag{3.1}$$

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[22] While most analyses of this type must also take into account left-censoring (i.e. spells that begin at some undefined time before the observation period starts), this is not an issue in this analysis because I have complete birth histories for all women included in the analysis. I am able to combine these with information on age at first marriage to construct a complete record of both the relevant intervals (first marriage to first birth and then the intervals between births). As a result, the exact length of each spell is known, including those that began prior to 1994.

where P_{it} is the conditional probability of an individual experiencing a birth at time t.

Time (t) in this case is the duration at risk of experiencing a birth of a given parity, and

not calendar time or age. β is the vector of coefficients representing the independent

variables included in the analyses (X_{it}). To ensure the temporal order is consistent with

the argument that the independent covariates cause fertility, I lag all of the independent

variables by two years, reflecting the delay between the deciding to have a child and the

birth of the child (a nine month pregnancy plus a five to seven month period while

waiting for conception)[23]. The term α_t represents the baseline hazard of progressing to

the subsequent parity, varying over time. The baseline hazard in all models is non-

parametric, with no specific functional form. In the fertility analysis, spell duration is

specified by a series of dummy variables capturing the length of the interval between

births. In order to account for the repeated nature of births, I include a variable with

information on prior spells: the number of prior spells an individual has experienced,

including the interval between marriage and first birth (see Box-Steffensmeir and Jones

2004, p.160 for a discussion of the relative merits of this approach). In addition, all

models are corrected for clustering at the individual level using the

Huber/White/Sandwich robust estimate of variance (StataCorp 2001).

The analysis includes a range of individual, household, and community

independent variables, all of which are time-varying. The explanatory variable of primary

interest in the fertility analysis is migration status. In keeping with other studies

examining different types of migration flows, I define migration status in each year on

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[23] Sensitivity tests were also conducted to examine whether the length of the lag influenced the results of the empirical analyses, with all models estimated with a lag of a single year, rather than two years. This did not significantly alter the findings or conclusions reached by these analyses, and as a result the two-year lag was retained.

the basis of the number, length, and frequency of migration movements (Guest et al. 1994; Massey 1987; Ogena and De Jong 1999). Five categories of migrants are included and are defined as follows: non-migrants are those individuals who lived in the origin village for the whole year; settled migrants are those who have lived continuously in an urban area for three years or more; recent migrants are those who have lived continuously in an urban area for two years or less; circular migrants are those who completed a cycle between an urban and rural area either within the year in question or over the prior two years; and return migrants, who are those who returned to the village from an urban area within the year in question or the year before[24]. While the effect of migration on fertility is likely to be relatively small given the low fertility prevalent in Nang Rong during this period, it is anticipated that the likelihood of experiencing a birth will be lower for migrants, both because of the disruptive effect of migration and the effect of living in the somewhat lower fertility environment prevalent in urban areas. In order to address the cumulative effect of past migration, the total number of months spent living in an urban location between age 13 and 1994 is also included in the analyses[25]. This variable is also expected to have a negative impact on the likelihood of a woman experiencing a birth,

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[24] This definition uses information from multiple person-years, including those of the prior two years. As a result, information from person-years prior to 1994 is used in the construction of the 1994 and 1995 migration status variables, although only person-years between 1994 and 2000 are included in the analysis.

[25] Respondents were asked to list all the locations they had lived in for two or more months in each year, with a maximum of six residences per year. However, there was no information on exactly how long was spent in each residence. In order to create an estimate of months spent in urban areas, two approaches were explored. The first divided the year equally between all listed residences (i.e. an individual reporting two residences in a given year was assigned a residence length of six months for each residence). The second approach assigned the minimum of two months to all urban residences, thus probably undercounting time spent in urban areas (individuals who only reported an urban residence in a year were assigned 12 months in an urban area). The months spent in an urban location between age 13 and 1994 were then summed. Models were estimated using both measures of migration experience in order to establish if the effects of migration were influenced by which of these two variables was used. The results of these analyses showed no significant differences between the two definitions, so the more conservative measure was used.

reflecting both the increased disruption associated with repeated migration events and the effect of assimilation on fertility preferences and behavior.

The additional individual-level variables included in the analysis are: age and its squared term, occupation (agricultural, construction, other non-agricultural, and not in the labor force), education level (completed years of formal education), years since first marriage, and a series of dummies indicating the length of the current interval. Because the exact timing of the birth during the year is unknown in the data, the midpoint of the year was used. A length of 0.5 years was assigned when the length of the interval was less than one year, such as when marriage and a birth took place within the same year. In addition, because there were very few births at intervals over 12.5 years in length, the lengths above this point were combined. In statistical terms, this is the equivalent of assuming that the hazard of a birth following this point is constant. This assumption is relatively safe in this context, where completed fertility is low and births are typically relatively closely spaced. The likelihood of a birth is expected to be lower for older women, those in non-agricultural occupations, those with more children, those that have been married longer, and those who have more experience living in urban areas prior to 1994.

The household characteristics included in the analyses are: household size, dependency ratio within the household, whether the household is multigenerational (which Rindfuss et al. 1996 find increases fertility in this context), the relative wealth of the household (based on asset ownership), and the education level of the most educated person in the household. These variables may influence fertility in a number of ways. Women from larger households with more dependents may respond by reducing their

fertility, particularly if the household is also poor. Alternatively, those from multigenerational households and/or relatively low educational levels may face greater pressure to have a birth.

The community-level variables included capture the degree to which the communities within which these women lived prior to migration are integrated into the modern economy. The variables included are: the distance to the nearest health center and hospital, whether the village had a primary school, the percentage of adults aged 15-45 with a non-agricultural occupation, the percentage of women of reproductive age using modern contraception, the percentage of teens aged 13-18 currently enrolled in school, and the percentage of households in the village that were poor. It is anticipated that those women from less developed villages (i.e. further from health care services, without a primary school, with lower percentages in non-agricultural employment, using contraception, and teens in school, and with a higher proportion of poor households) will be less likely to have a birth. In addition, a dummy indicating whether the person-year was prior to or after 1997 was included to capture the effect of the economic crisis that struck Thailand beginning in 1997 was also included. Given the increased poverty and hardship that resulted from the crisis in Thailand as a whole, I expect that the likelihood of a birth will be lower following the crisis.

Table 3.1 presents the descriptive statistics for the independent variables used in the logistic discrete-time models of fertility behavior, disaggregated by migration status. In the case of the individual level variables, these vary year-by-year, and are based on information gathered using life histories[26]. In contrast, the household and community

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[26] This is also true for parity, which was created by combining the information on previous births collected in 1994 with the yearly information on births collected as a part of the life history calendar.

level variables are based on data collected in the 1984 and 1994 waves of data collection. Because these change over time, they are also considered time-varying, but this variation is not year-by-year. Rather, the household and community information from the 1984 wave of data collection is used in all the years prior to 1994, and the information from the 1994 wave for all years between 1994 and 2000[27].

Non-migrants are on average older, more likely to be employed in agricultural employment, less educated, have been married longer, have more children, and have spent much less time in urban areas prior to 1994 than migrants, particularly those who are more established in urban areas. In addition, non-migrants have more children than migrants, partly a reflection of their higher average age and greater time spent in a marital relationship. Some interesting differences are also evident between the different migrant groups. Migrants with a shorter time in the destination are more likely to employed in construction, which provides shorter-term employment, while more established migrants were more likely to be employed in more established non-agricultural employment. Both circular and return migrants are more likely than recent or settled urban migrants to be employed in the agricultural sector, although both are also more likely to be employed in non-agricultural occupations than non-migrants. Settled migrants have also on average much more experience living in urban areas prior to 1994, suggesting that their choice to settle more permanently is a continuation of a pattern of extended residence in urban areas. In contrast to these individual-level differences between groups, there is relatively little difference between the migration groups in terms of household and community

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[27] While the analysis focuses on births in the years between 1994 and 2000, information from years prior to 1994 is included in the analysis in the form of lags.

characteristics, suggesting that the primary determinants of migration status in this

context are individual characteristics.

Migrant Selectivity Analysis

In order to examine how the process of migrant selection influences the results

generated by the discrete-time analysis of fertility behavior, I focus on the determinants

of migration to an urban area in any given person-year. However, in this analysis I

greatly simplify the migration status variable, including a dummy variable indicating

whether a woman was a migrant at all in that person-year. I use logistic regression

techniques to determine the extent to which this is dependent on individual, household,

and community characteristics, with the dependent variable being a dichotomous variable

indicating whether the woman was a non-migrant or not in any given person-year. The

independent variables are the same as those in the fertility analysis, with the exception of

the years since first marriage variable and the dummy variables indicating the length of

the spell between births. These variables are all lagged by one year, again reflecting the

temporal order of the migration decision-making process, with the lag between the

decision to migrate and that actual event being smaller than that for fertility.

Endogeneity Analysis

The role of endogeneity in influencing the results of the fertility analysis is

explored using a bivariate probit modeling approach. This approach differs in a three

important ways from the discrete time approach described above. Firstly, this technique is best suited to examining relationships at single points in time, rather than across time as is the case for event history methods. In order to accommodate this, I examine each calendar year separately from the other, including all women aged 18 to 35 that year in the analysis. Secondly, in order to both simplify the analysis as much as possible and meet the needs of the modeling techniques I adopt, the dependent variable is again a dummy variable indicating whether a woman was a migrant at all in that person-year, as is the case for the selectivity analysis described above. Thirdly, this analysis is not stratified by parity, primarily because the restriction to a year-by-year analysis does not result in sufficient sample sizes for the analysis of sub-sample groups.

I begin by estimating a 'naïve' probit model of the determinants of fertility that does not take into account the potential endogeneity of migration, with the dependent variable being a dummy variable indicating whether a woman experienced a birth at time t. The model is specified as follows:

$$F_{it}^* = \beta_1 X_{1t-2} + \beta_2 Mig_{it-2} + \varepsilon_{it} \quad \text{where } F_{it} = 1 \text{ if } F_{it}^* > 0, \text{ 0 otherwise.} \quad (3.2)$$

where F_{it}^* represents a woman's latent propensity to experience a birth at time t; X_{1t-2} refers to a vector of the individual, household, and community characteristics influencing fertility described in the discrete-time model, lagged by two years; Mig_{it-2} is a dichotomous categorical variable indicating an individual's migration status, lagged by two years; and ε_i refers to the disturbance term, which is normally distributed, N(0,1).

To account for the potential endogeneity between migration and fertility behavior I estimate bivariate probit models for fertility and migration and allowing the errors of

each equation to correlate with the other. This approach is based broadly on the principle

of seemingly unrelated regressions model (Greene 2000). Implementing this approach

requires each of the outcome variables be dichotomous, including that of migration, as

discussed above. This model is specified in the following way:

$$F_{it}^* = \beta_1 X_{1t-2} + \beta_2 Mig_{it-2} + \varepsilon_{it} \quad \text{where } F_{it} = 1 \text{ if } F_{it}^* > 0, 0 \text{ otherwise.} \tag{3.3}$$

$$Mig_{it-2}^* = \beta_1 X_{1t-3} + \mu_{it-2} \quad \text{where } Mig_{it-2} = 1 \text{ if } Mig_{it-2}^* > 0, 0 \text{ otherwise.} \tag{3.4}$$

$$E[\varepsilon_{it}] = E[\mu_{it-2}] = 0$$

$$Var[\varepsilon_{it}] = Var[\mu_{it-2}] = 1$$

$$Cov[\varepsilon_{it}, \mu_{it-2}] = \Omega$$

As with F_{it}^*, Mig_{it-2}^* refers to the latent propensity to be of a given migrant status.

In keeping with the hypothesized relationship between these variables and the occurrence

of a birth, these variables are lagged by two years, while the variables in the migration

equation are lagged one additional year. X_{1t-2} and X_{1t-3} are vectors of individual,

household, and community variables influencing fertility and migration respectively. ε_{it}

and μ_{it-2} are the disturbance terms for each equation, while Ω is a 2x2 covariance matrix

for the two disturbance terms. The role of the time lags in these models is twofold.

Firstly, as in the discrete-time model, these lags are theoretically justified, as the fertility

decision and the actual birth do not take place simultaneously. Secondly, the inclusion of

these lags aids in the identification of the model.

I then compare the estimated coefficients generated by this model with those of the 'naïve' model described above, focusing particularly on how the estimated effects of migration and marriage change once endogeneity is accounted for. In contrast to the discrete-time analysis, I do not model the likelihood of births separately for low and high parity women. This is primarily for practical reasons, as the number of births to higher order women in individual years was in some cases too small for meaningful statistical analyses.

Results

In this section, I begin by presenting the results of the three components of the analyses separately, highlighting the key findings of interest to this paper. I then follow this with a discussion of the implications these analyses have for the relationship between migration and fertility in this context. Table 3.2 displays the results from the discrete-time logistic regression models estimating the occurrence of a birth for low parity women (one child or less), high parity women (two children or more), and the full sample. The variables included in all models are the same, with the exception of the dummy variable indicating an interval length of 0.5 in the model for high parity women[28], and are all lagged by two years[29]. While there are a number of findings of note in Table 3.2, in keeping with the focus of this paper the discussion of the results is focused primarily on

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[28] Among this group of women there were no births in this interval. As a result, the person years in this interval were combined with the interval length of 1.5. This assumes that the hazard is constant for this group of women for the first 1.5 years following their previous birth.

[29] The exception to this is the number of previous intervals a woman has had, which is not lagged. This variable is included primarily in order to account for the potentially repeated nature of the outcome (births), and as such has no direct interpretation of relevance to this research.

the role of migration status and experience on the likelihood of experiencing a birth. The most striking feature of these results are the differences between the models for low and high parity women, particularly in terms of the effect of both migration status and past experience. For lower parity women, having been a migrant at time t-2, which approximates the period when the fertility decision was made, has a strong positive effect on the likelihood of experiencing a birth, regardless of the permanence of the migration status. This effect is strongest for those who were circular migrants, who are over 60 percent ($\exp^{0.401}$=1.61) more likely to have a birth in any given person-year than women who were non-migrants, although those who were settled or recent migrants are also approximately 50 percent more likely to experience a birth than non-migrants. These findings are particularly interesting given the negative effect of migration experience between age 13 and 1994, with each additional month spent as a migrant reducing the likelihood of having a birth by approximately two percent. A second finding of interest to this study is that there is relatively little difference in the effect of the different migration statuses on fertility behavior. While there are differences in the magnitude of the effect of migration status on fertility, both being either a permanent and temporary migrant at time t-2 encourages births for lower parity women, while neither has a statistically significant effect on births for higher parity women. Being a circular migrant at time t-2 has the greatest effect on fertility, increasing the likelihood of having a birth by over 60 percent relative to non-migrants. This compares to 55 and 49 percent for recent and settled migrants respectively, while return migrants did not differ from non-migrants to a statistically significant degree.

In contrast, both migration status and previous migration experience have no statistically significant effect on the likelihood of experiencing a birth for higher parity women, for whom the only individual level variables that influenced the likelihood of a birth were having a non-agricultural occupation other than construction and years since first marriage. The effect of the latter variable confirms that women who have been married longer and are therefore towards the end of the family formation process are less likely to have a birth, while the positive effect of the former suggests that the additional income gained by non-agricultural employment encourages fertility. It is interesting to note that this has the opposite effect for lower parity women, for whom a non-agricultural occupation other than construction lowers the likelihood of birth. The fertility behavior of these women was also more responsive to household and community factors than that of lower parity women.

The results of these analyses indicate that the relationship between migration and fertility in this setting is more complex than that posited by either the assimilation, adaptation, or disruption hypotheses, and suggests that migration is related to the family formation process in a broader way than is addressed by these approaches. The combination of the strong effects of both migration status at time t-2 and cumulative migration experience for lower parity women with the lack of any effect for women of higher parities suggests a linkage between migration and family formation that goes beyond a direct influence on fertility behavior. In addition, while the negative effect of cumulative migration experience on fertility is consistent with both the assimilation and disruption hypotheses, the strong positive effect of migration on fertility is contrary to the expectations of each of the assimilation, adaptation, and disruption hypotheses. This

suggests that the relationship between fertility and migration in this context is to a significant extent a reflection of unobserved migrant selectivity related to the family formation process.

In order to explore this further, I now turn to the analysis of the determinants of migration status. The results of the logistic regression model predicting whether a woman was a migrant in any given year are presented in Table 3.3. The variables included in the models are the same as those used in the analysis of births, with the addition of marital status and parity and the removal of years since first marriage[30]. As expected, migration status is influenced by a variety of factors, particularly at the individual level. Of the variables indicating family formation stage, only age had a significant effect on being a migrant the following year, with each additional year of age increasing the likelihood of being a non-migrant by over 50 percent. Women with non-agricultural jobs or who were not in the labor-force in the previous year were significantly less likely to be non-migrants, suggesting that in part the decision to migrate is based on both non-agricultural skills and financial ability to migrate. However, these results should be interpreted with some care, as this may in part be capturing migration status from the previous year, as urban migrants in this context are overwhelmingly employed in non-agricultural occupations. Finally, women with more migration experience between age 13 and 1994 were considerably less likely to be non-migrants, with each additional month spent in an urban area during this period reducing the

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[30] The information on the marital status of respondents was collected only as a part of the three waves of data collection. As a result, women are categorized only as 'ever-married' for the person-years following their reported age at first marriage, and 'never-married' for the person-years before that. This definition ignores changes in marital status, such as through divorce, which is relatively common in Thailand (Limanonda 1992). Never-married women were assigned a parity of zero. A squared term for parity is also included in the model in order to capture any potentially non-linear relationship between parity and migration status. Years since first marriage was removed from the equation because this analysis includes women who had not been married.

likelihood of being a non-migrant by 14 percent. This suggests that the experience of migration changes both attitudes and perceptions that encourage future migration, a finding consistent with approaches to understanding of migration that emphasize the role of cumulative causation (see Massey et al. 1994 for a discussion of this approach and the empirical evidence supporting it). Finally, women were considerably more likely to be a non-migrant after the economic crisis that started in 1997, reflecting the decreased employment opportunities for migrants following the crisis.

Relatively few of the household and community-level variables had a statistically significant effect on migration. At the household level, the only factor influencing migration status in the following year was whether the women came from an extended multigenerational household, which decreased the likelihood of a woman being a non-migrant. There are a number of reasons for why this household structure may encourage migration. In particular, women from these households may be able to rely to a greater extent on their parents as a source of childcare for their children, making migration a more feasible option. In addition, these women may migrate in order to raise funds in anticipation of having to care for both their elderly parents and children simultaneously at a further point in time. At the community level, both distance to the nearest health center and distance to the nearest hospital encouraged migration, while having a primary school in the village discouraged it. This suggests that women from villages with a less developed infrastructure are more likely to migrate. These findings are consistent with the general arguments of the multiphasic response framework developed in Chapter Two, as women from these villages are likely to be less integrated into the modern economy

and to be subject to higher levels of strain, particularly relative to women in villages with a more developed infrastructure.

The results of this analysis suggest that migration is selective of younger women from less privileged backgrounds who have prior experience with both migration and non-agricultural employment. While the analysis does not provide direct support for a linkage between migration and the family formation process, the selection of these women into migration may be related to family formation, and particularly union formation, in a number of ways. Firstly, prior research has found that migrant women who worked in non-agricultural occupations were significantly more likely to marry, largely as a result of exposure to a larger pool of potential partners, although this differs somewhat between professions (Jampaklay 2003). The strong effect of non-agricultural employment in the prior years suggests that these women have been previously exposed to this environment, and are likely to have non-agricultural employment in the destination location. Secondly, while family formation stage is not a strong factor in selecting migrants, this does not necessarily imply that migration does not encourage union formation once the migrant is in the destination.

The results of the analysis of the effect of endogeneity on the estimated effect of migration are presented in Table 3.4. For ease of presentation, only the individual level variables for the analysis of fertility are presented. Two sets of results are presented for each year in the analysis. The first are those of the naïve model, which does not take into account endogeneity, while the second are those of the bivariate probit. The equation for migration behavior includes all of the variables used in the fertility analysis, with the exception of information on interval length and the number of previous intervals. In

addition, the lag used in the migration equation extends one year beyond that of the fertility equation (i.e. the lag used is of three years).

The results of this analysis largely confirm the findings of the discrete-time analysis, and do not present a challenge the validity of the results of this analysis. Weak statistical evidence of endogeneity was found in only two of the seven years covered by this study. The two years were 1995 and 1997, for which the p-value of the Wald test of the rho was 0.0990 and 0.0838 respectively. While taking endogeneity into account potentially may change the effect of a number of explanatory variables, I focus on the effect of the migration variable as this is the variable of primary interest to this paper. In 1995, the dummy variable for migration status was statistically insignificant in both the naïve probit model and the bivariate probit model, although the direction of the effect was different (the only year where this was the case), and total urban experience became significant when endogeneity was taken into account (although the direction of the predicted effect remained the same). The only difference between the two models in 1997 was the magnitude of the coefficient for the migration dummy variable, which approximately doubled. These results suggest that while the relationship between these processes may be endogenous, this does not necessarily result in seriously biased coefficient estimates and in neither case did this alter the relationships established by the discrete-time hazards approach. This is likely due to the incorporation of lags into both sets of analyses, which establishes a clear temporal order for the relationship between the two processes.

These analyses together provide strong evidence that the relationship between migration and fertility in this context is influenced to a significant extent by the ways in

which the overall family formation process is related to migration. While the negative

effect of cumulative migration experience on fertility lends some support to the

assimilation and disruption hypotheses, the results of both the discrete-time event history

and bivariate probit analyses suggest that the effect of migration on fertility appears to be

related to factors other than those addressed by the standard hypotheses explaining this

relationship. As implied in the discussion above, the most plausible explanation for the

results of the discrete-time analysis is that the migration process in this context is

selective of groups of individuals at early stages in the family formation process. As a

result, these individuals will be more likely to marry in any given year and, given the

close temporal link between marriage and parenthood in this setting, also to have a birth.

While the selection analysis provides mixed support for this approach, the selection of

younger women with prior experience in non-agricultural occupations into migration is

likely to result in increased rates of marriages and, by extension, births. This is supported

by the strong effect of shorter-term migration movements, which often involve situations

where large groups of migrants are housed in relatively close proximity, increasing the

likelihood of finding a marital partner while a migrant. While this argument is broadly

consistent with the selectivity hypothesis, these results are more suggestive of the type of

framework suggested by Singley and Landale (1998), who argue for a broader

conceptualization of this approach that explicitly acknowledges of the role of migration

in the process of family formation.

Conclusions

The emergence of high levels of population mobility is one of the more pervasive features of the contemporary development process, particularly when temporary migration flows are taken into account. However, while the effect of migration on fertility is a persistent theme in demographic research, relatively few studies have explicitly examined how this relationship differs for short- and long-term migrants, or how this is influenced by migration experience over the life course. In this paper, I explore the ways in which migration influences the fertility behavior of women in Nang Rong, Thailand, using a combination of detailed prospective cross-sectional data and detailed life-history information. These data allow me to extend prior research in this area by developing a detailed measure of migration status based on the number, frequency, and duration of migration experiences in urban areas and by explicitly exploring how the relationship between migration and fertility varies according to family formation stage. In addition, this study takes advantage of the prospective design of the data to empirically examine how the relationship between migration and fertility is influenced by selectivity, and how the empirical results are influenced by the endogeneity of the two processes. This allows for a more comprehensive analysis of the relationship between migration and fertility, therefore providing a concrete illustration of the ways in which the demographic processes of migration and family formation are related that incorporates both the insights of prior research examining the relationship between migration and fertility and those of life course theory.

The results of the analyses in this paper illustrate well the complexity of the relationship between migration and fertility, particularly in contexts of rapid social and

economic change.   In particular, these highlight the ways in which migration has become an integral part of the life course of many women from Nang Rong, as is the case in many rural areas of developing countries. In these contexts, migration has become an important part of an overall process of family formation that includes both union formation and fertility. This has a number of implications for our understanding of how migration influences fertility behavior, both in Thailand and in other settings of rapid social, economic, and demographic change. Firstly, the results suggest that lifetime migration experience affects fertility in ways not adequately captured by more static measures of migration status. The analyses found relatively little evidence of significant differences between short- and long-term migration in terms of their effect on fertility, with each of the of the migrant statuses that included current migrants having a positive effect on fertility. This suggests that in this context, where the fertility patterns of rural and urban areas are not markedly different and the geographical distances between origin and destination are relatively small, migration does not influence fertility through the processes described by the assimilation, adaptation, or disruption hypotheses. However, the negative influence of total time spent in urban areas does offer limited support to the assimilation and, to a lesser extent, disruption hypotheses. While appearing to be contradictory, this is consistent with the expectations of the assimilation hypothesis, which assumes that changes in preferences and behavior unfold over an extended period of time. As a result, the effects of the process of assimilation are likely to be only evident when an extended view of the life course is taken into account, suggesting that measures of migration status based on a limited range of years may not be able to adequately capture the effects of assimilation. While the measures of migration status employed in

this study are unusually detailed and include information on duration of time as a migrant, the period of time they encompass is likely to be too short to see the effects of assimilation. In contrast, these measures are well suited to the examination of the effect of adaptation and disruption on fertility, and the absence of any evidence for their effects suggests that their impact on fertility in this context is limited. This is not surprising given the setting, for the reasons discussed above.

These results also imply that both life course and family formation stage are important factors in shaping the way in which migration affects fertility behavior, as is illustrated by the difference between the effect of migration status for women with less than two children and those with two or more children. This suggests that research in this area must take this into account when exploring this relationship. In addition, the role of migration in the family formation process must also be accounted for in the analysis, as this influences the way in which migration and fertility may be related. In the case of this study, accounting for the role of migration in the family formation process provides a clear explanation for the positive effect of migration on fertility found for women with one child or less, a finding that is not easily explained by the standard hypotheses explaining this relationship. Incorporating this approach is especially important in settings where migration itself can be thought of as a part of the family formation process. This may take a variety of forms and is not unique to settings such as Nang Rong where migration is very common. For example, migration for the purposes of marriage is common throughout the world, and the process of union formation itself may encourage migration as the couple seeks to establish an independent household.

Alternatively, migration may be a means for gathering sufficient wealth to enable both marriage and childbearing.

This study provides general support for an approach to the relationship between migration and fertility that is based on a broader conceptualization of the role of migration in the life course, and in the family formation process specifically, as also suggested by Singley and Landale (1998). This implies a reframing and extension of existing theories explaining the relationship between migration and fertility in a way that incorporates a broader understanding of how different aspects of human behaviors are related across the life course, and how this in turn is related to the selectivity of migrants. Prior research in this area has for the most part either not been able to address these issues, or done so in a limited fashion. In large part this reflects the lack of suitable data to explore these issues within a dynamic framework that allows for the inclusion of life course information and is also able to explore the issue of selectivity in shaping these results, particularly in developing country settings. As a result, much of our understanding of the ways in which migration affects fertility is likely to be incomplete.

This study is able to address these issues through the use of yearly information on a range of variables, including migration and fertility, in combination with prospective cross-sectional data. This allowed a comprehensive analysis of the role of migration in shaping fertility behavior in a context of rapid change. While care must be taken in generalizing the findings of this study too broadly given the unusual speed and scale of the social, economic, and demographic changes that have taken place in Thailand over the past three decades, the results of the analyses conducted in this paper are broadly applicable to societies where migration is closely tied to family formation. The results

suggest that there is much to gain in terms of understanding the effect of migration on fertility from the broader perspective of the life course, and that future research in this area should attempt to explicitly take into account the potential interactions between migration and other aspects of the life course, particularly the process of family formation.

Figure 3.1: Age, Period, and Cohort of Individuals Included in the Nang Rong Life History Data.

Year	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01*
	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13						
		14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14					
			15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15				
				16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16			
					17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17		
						18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	**18**	**18**	**18**	**18**	**18**	**18**	**18**	18
							19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	**19**	**19**	**19**	**19**	**19**	**19**	**19**	19
								20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	**20**	**20**	**20**	**20**	**20**	**20**	**20**	20
									21	21	21	21	21	21	21	21	21	21	21	21	21	21	**21**	**21**	**21**	**21**	**21**	**21**	**21**	21
										22	22	22	22	22	22	22	22	22	22	22	22	22	**22**	**22**	**22**	**22**	**22**	**22**	**22**	22
											23	23	23	23	23	23	23	23	23	23	23	23	**23**	**23**	**23**	**23**	**23**	**23**	**23**	23
												24	24	24	24	24	24	24	24	24	24	24	**24**	**24**	**24**	**24**	**24**	**24**	**24**	24
													25	25	25	25	25	25	25	25	25	25	**25**	**25**	**25**	**25**	**25**	**25**	**25**	25
														26	26	26	26	26	26	26	26	26	**26**	**26**	**26**	**26**	**26**	**26**	**26**	26
															27	27	27	27	27	27	27	27	**27**	**27**	**27**	**27**	**27**	**27**	**27**	27
																28	28	28	28	28	28	28	**28**	**28**	**28**	**28**	**28**	**28**	**28**	28
																	29	29	29	29	29	29	**29**	**29**	**29**	**29**	**29**	**29**	**29**	29
																		30	30	30	30	30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	30
Age																			31	31	31	31	**31**	**31**	**31**	**31**	**31**	**31**	**31**	31
																				32	32	32	**32**	**32**	**32**	**32**	**32**	**32**	**32**	32
																					33	33	**33**	**33**	**33**	**33**	**33**	**33**	**33**	33
																						34	**34**	**34**	**34**	**34**	**34**	**34**	**34**	34
																							35	**35**	**35**	**35**	**35**	**35**	**35**	35
																								36	36	36	36	36	36	36
																									37	37	37	37	37	37
																										38	38	38	38	38
																											39	39	39	39
																												40	40	40
																													41	41
																														42

Note: * denotes migrant follow-up only

Adapted from Jampaklay 2003

Table3.1: Descriptive Statistics for Independent Variables Used in Fertility Analyses, by Migration Status.

	Non-Migrant		Settled Migrant		Recent Migrant		Circular Migrant		Return Migrant	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Individual Characteristics										
Age	25.65	4.56	24.06	4.07	22.65	4.63	23.66	4.67	23.50	4.20
Occupation										
Agricultural	0.75	0.43	0.02	0.14	0.02	0.13	0.36	0.48	0.59	0.49
Construction	0.01	0.09	0.07	0.26	0.18	0.38	0.22	0.41	0.03	0.18
Other Non-Agricultural	0.20	0.40	0.79	0.41	0.72	0.45	0.37	0.48	0.30	0.46
Not in Labor Force	0.04	0.19	0.12	0.33	0.09	0.28	0.05	0.22	0.07	0.26
Education										
Education Level	5.73	2.20	6.39	2.49	6.48	2.42	5.78	1.69	6.03	2.02
Family Formation Stage										
Parity	1.38	1.03	0.79	0.85	0.69	0.86	1.04	1.04	0.94	0.83
Years Since First Marriage	5.38	4.35	3.91	3.94	2.87	3.85	3.82	4.30	2.95	3.55
Migration Experience										
Time in Urban between age 13 and 1994 (months)	2.02	4.13	22.14	7.78	12.45	7.22	11.14	8.31	11.18	7.18
Historical and Interval Time										
1994-1996	0.68	0.47	0.60	0.49	0.73	0.45	0.75	0.43	0.62	0.49
1997-2000	0.32	0.47	0.40	0.49	0.27	0.45	0.25	0.43	0.38	0.49
Length of Interval (years)	4.86	4.18	3.76	3.39	3.39	3.38	3.80	3.91	2.99	2.95
Household Characteristics (either 1984 or 1994)										
Household Size	5.18	2.11	4.95	2.23	4.98	2.18	5.14	2.18	4.94	2.19
Extended Household	0.60	0.49	0.59	0.49	0.55	0.50	0.61	0.49	0.59	0.49
Number of dependents	1.90	1.37	1.89	1.59	1.99	1.48	1.94	1.43	1.78	1.40

Table 3.1: Descriptive Statistics for Independent Variables Used in Fertility Analyses, by Migration Status (continued).

	Non-Migrant		Settled Migrant		Recent Migrant		Circular Migrant		Return Migrant	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Household Wealth										
Poor	0.28	0.45	0.31	0.46	0.27	0.45	0.35	0.48	0.34	0.47
Middle	0.53	0.50	0.53	0.50	0.57	0.50	0.51	0.50	0.49	0.50
Rich	0.19	0.39	0.16	0.36	0.16	0.37	0.14	0.35	0.17	0.38
Education Level of Most Educated Member (years)	6.40	2.51	6.31	2.27	6.32	2.38	6.00	1.91	6.39	2.25
Community Characteristics (either 1984 or 1994)										
Distance to Health Center (km.)	2.76	1.29	2.73	1.32	2.71	1.31	2.96	1.49	2.74	1.32
Distance to Hospital (km.)	16.65	5.01	16.23	4.65	16.55	4.65	16.46	5.55	15.94	4.82
Primary School in Village	0.62	0.49	0.57	0.50	0.58	0.49	0.62	0.49	0.53	0.50
% of Adults with Non-Agricultural Occupation	20.35	9.09	22.26	8.84	20.97	9.21	21.45	8.56	21.89	8.39
% Women of Reproductive Age using Contraception	62.65	14.45	62.79	14.40	61.58	15.16	61.78	13.93	64.42	13.64
% Teens (13-18) Currently in school	31.72	12.45	33.56	12.63	32.65	11.99	31.50	12.79	33.09	12.53
% Households in Village Poor	31.86	10.73	32.50	11.76	31.76	10.35	32.33	10.00	31.64	9.85
N (person-years)	6430		941		726		834		820	

Table 3.2: Parameter Estimates for Discrete-Time Logit Model Predicting Birth in a Given Person-Year between 1994 and 2000 - Women Aged 18-35 in 1994-2000.

Independent Variables (t-2)	Low Parity Women β	Low Parity Women S.E.	High Parity Women β	High Parity Women S.E.	All Women β	All Women S.E.
Individual Characteristics						
Age	-0.031	(0.047)	0.010	(0.082)	-0.025	(0.035)
Age^2	0.001	(0.001)	-0.001	(0.002)	0.000	(0.001)
Migration Status						
Non-Migrant (reference)						
Settled Migrant	0.401	(0.178)**	0.647	(0.555)	0.342	(0.171)**
Recent Migrant	0.437	(0.146)***	-0.297	(0.533)	0.335	(0.141)**
Circular Migrant	0.477	(0.135)***	0.268	(0.369)	0.426	(0.125)***
Return Migrant	0.075	(0.145)	-0.325	(0.499)	0.040	(0.138)
Migration Experience						
Time in Urban between age 13 and 1994	-0.022	(0.007)***	-0.018	(0.017)	-0.017	(0.006)***
Occupation						
Agricultural (reference)						
Construction	-0.241	(0.193)	-0.231	(0.540)	-0.235	(0.181)
Other Non-Agricultural	-0.294	(0.103)***	0.524	(0.251)**	-0.174	(0.097)*
Not in Labor Force	-0.229	(0.180)	0.489	(0.369)	-0.092	(0.163)
Education						
Education Level	0.022	(0.020)	-0.110	(0.070)	0.007	(0.020)
Family Formation Stage						
Years Since First Marriage	-0.016	(0.027)	-0.134	(0.043)***	-0.074	(0.023)***
Historical and Interval Time						
1994-1996 (reference)						
1997-2000	-0.521	(0.093)***	-0.542	(0.249)**	-0.497	(0.086)***
Length of Interval (years)						
0.5	-1.241	(0.469)***	--	--	-1.154	(0.345)***
1.5	-0.305	(0.461)	-1.978	(0.675)***	-0.271	(0.330)
2.5	-0.474	(0.469)	-0.927	(0.568)	-0.360	(0.338)
3.5	-0.365	(0.463)	-0.697	(0.586)	-0.197	(0.335)
4.5	0.025	(0.454)	0.144	(0.542)	0.284	(0.326)
5.5	-0.099	(0.452)	-0.029	(0.559)	0.173	(0.328)

Table 3.2: Parameter Estimates for Discrete-Time Logit Model Predicting Birth in a Given Person-Year between 1994 and 2000 - Women Aged 18-35 in 1994-2000 (Continued).

Independent Variables (t-2)	Low Parity Women β	Low Parity Women S.E.	High Parity Women β	High Parity Women S.E.	All Women β	All Women S.E.
Length of Interval (years)						
6.5	-0.156	(0.449)	-0.450	(0.582)	0.066	(0.329)
7.5	-0.495	(0.464)	0.100	(0.534)	-0.052	(0.338)
8.5	-0.169	(0.464)	-0.249	(0.533)	0.044	(0.335)
11.5	-0.789	(0.596)	-0.075	(0.541)	-0.343	(0.385)
12.5+	-1.357	(0.604)**	-0.830	(0.549)	-1.172	(0.392)***
Household Characteristics (either 1984 or 1994)						
Household Size	-0.017	(0.035)	-0.085	(0.079)	-0.020	(0.032)
Extended Household	0.020	(0.099)	0.949	(0.233)***	0.158	(0.090)*
Number of dependents	0.011	(0.046)	0.064	(0.103)	0.010	(0.041)
Household Wealth						
Poor (reference)						
Middle	-0.096	(0.089)	-0.241	(0.215)	-0.097	(0.081)
Rich	-0.017	(0.123)	-0.042	(0.276)	-0.005	(0.109)
Education Level of Most Educated Member	0.001	(0.018)	-0.032	(0.050)	-0.004	(0.017)
Community Characteristics (either 1984 or 1994)						
Distance to Health Center (km.)	-0.038	(0.029)	-0.003	(0.066)	-0.031	(0.026)
Distance to Hospital (km.)	0.003	(0.009)	0.047	(0.021)**	0.008	(0.008)
Primary School in Village	0.139	(0.102)	-0.577	(0.248)**	0.028	(0.094)
% of Adults with Non-Agricultural Occupation	0.003	(0.006)	0.021	(0.014)	0.005	(0.005)
% Women of Reproductive Age using Contraception	-0.004	(0.003)	-0.008	(0.008)	-0.005	(0.003)*
% Teens (13-18) Currently in school	0.004	(0.004)	0.004	(0.012)	0.004	(0.004)
% Households in Village Poor	0.000	(0.004)	-0.009	(0.009)	-0.002	(0.004)
Information on Previous Intervals						
Number of Previous Intervals	-0.874	(0.090)***	-0.417	(0.210)**	-0.856	(0.083)***
Number of Observations		6202		3359		9751

Note: * $p<0.1$, ** $p<0.05$, *** $p<0.001$. Numbers in parenthesis are robust standard errors.

Table 3.3: Parameter Estimates from a Logistic Regression Predicting Migration Status in a Given Person-Year, Women aged 18-35 between 1994 and 2000.

Independent Variables (t-1)	Non-Migrant vs. Other	
	β	S.E.
Individual Characteristics		
Age	0.411	(0.135)***
Age^2	-0.005	(0.003)*
Occupation		
Agricultural (reference)		
Construction	-3.135	(0.282)***
Other Non-Agricultural	-1.148	(0.112)***
Not in Labor Force	-1.036	(0.215)***
Education		
Education Level	0.028	(0.032)
Family Formation Stage		
Not-Married		
Ever-Married	0.100	(0.126)
Parity	0.072	(0.111)
Parity^2	-0.005	(0.022)
Years Since First Marriage		
Migration Experience		
Time in Urban btwn. age 13 and 1994	-0.276	(0.014)***
Historical Time		
1994-1996 (reference)		
1997-2000	0.242	(0.100)**
Household Characteristics (either 1984 or 1994)		
Household Size	0.022	(0.052)
Extended Household	-0.285	(0.156)*
Number of dependents	-0.021	(0.066)
Household Wealth		
Poor (reference)		
Middle	-0.014	(0.132)
Rich	0.077	(0.183)
Education Level of Most Educated Member	0.044	(0.031)
Community Characteristics (either 1984 or 1994)		
Distance to Health Center (km.)	-0.092	(0.045)**
Distance to Hospital (km.)	-0.024	(0.014)*
Primary School in Village	0.322	(0.146)**
% of Adults with Non-Agricultural Occupation	0.006	(0.008)
% Women of Reproductive Age using Contraception	0.006	(0.005)
% Teens (13-18) Currently in school	-0.007	(0.007)
% Households in Village Poor	0.000	(0.006)
Constant	-4.326	(1.684)
N	10678	

Note: * p<0.10, ** p<0.05, ** p<0.001. Numbers in parenthesis are robust standard errors.

Table 3.4: A Comparison of the Parameter Estimates of Individual Level Variables in the Fertility Model Generated by a 'Naïve' Probit Model not taking Endogeneity into Account with those From a Bivariate Probit: Year-by-Year Analysis

	1994		1995		1996		1997	
	Naïve Model	Bivariate Probit	Naïve Model	Bivariate Probit	Naïve Model	Bivariate Probit	Naïve Model	Bivariate Probit
Age	0.196	0.213	0.150	0.111	0.089	0.064	0.090	0.113
	(0.136)	(0.129)*	(0.125)	(0.113)	(0.133)	(0.116)	(0.125)	(0.108)
Age^2	-0.005	-0.005	-0.003	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.003)	(0.003)*	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)
Migration Status								
Was Migrant (dummy)	0.003	0.296	0.090	-0.488	0.175	-0.596	0.415	0.921
	(0.176)	(0.507)	(0.171)	(0.370)	(0.175)	(0.674)	(0.167)**	(0.316)***
Migration Experience								
Time in Urban	-0.006	-0.015	0.008	0.026	-0.019	0.007	-0.021	-0.037
	(0.008)	(0.017)	(0.007)	(0.012)**	(0.009)**	(0.024)	(0.008)**	(0.012)***
Occupation								
Agricultural (reference)								
Construction	0.143	0.118	-0.164	-0.056	-0.091	0.016	-0.264	-0.354
	(0.230)	(0.218)	(0.227)	(0.205)	(0.260)	(0.253)	(0.292)	(0.269)
Other Non-Agricultural	-0.164	-0.194	-0.201	-0.121	0.015	0.085	-0.024	-0.113
	(0.139)	(0.140)	(0.142)	(0.145)	(0.135)	(0.146)	(0.131)	(0.131)
Not in Labor Force	-0.236	-0.271	-0.341	-0.279	-0.353	-0.259	-0.056	-0.087
	(0.273)	(0.259)	(0.261)	(0.258)	(0.267)	(0.282)	(0.229)	(0.237)
Education								
Education Level	0.010	0.012	0.030	0.026	-0.035	-0.038	0.000	0.003
	(0.025)	(0.024)	(0.028)	(0.025)	(0.029)	(0.027)	(0.024)	(0.023)
Family Formation Stage								
Parity	0.337	0.341	-0.347	-0.362	-0.405	-0.420	-0.437	-0.44
	(0.210)	(0.195)*	(0.137)**	(0.117)***	(0.143)***	(0.119)***	(0.138)***	(0.125)***
$Parity^2$	-0.139	-0.140	0.043	0.044	0.035	0.039	0.065	0.065
	(0.070)**	(0.061)**	(0.027)	(0.020)**	(0.030)	(0.018)**	(0.021)***	(0.014)***
Years Since First Marriage	0.003	0.003	-0.007	-0.003	-0.051	-0.043	-0.009	-0.011
	(0.030)	(0.028)	(0.027)	(0.024)	(0.031)*	(0.026)	(0.026)	(0.026)
# Previous Intervals	-0.592	-0.583	-0.223	-0.231	-0.267	-0.290	-0.298	-0.282
	(0.143)***	(0.127)***	(0.125)*	(0.117)**	(0.111)**	(0.112)***	(0.107)***	(0.117)**
Constant	-4.295	-4.566	-2.310	-1.74	-0.845	-0.341	-2.031	-2.377
	(1.668)**	(1.513)***	(1.567)	(1.470)	(1.705)	(1.672)	(1.603)	(1.439)*
Rho Wald Test X^2		0.528		0.099		0.311		0.084
N	1408		1342		1354		1410	

Note: Robust Standard errors in parentheses   * p<0.10, ** p<0.05, ** p<0.001

Table 3.4: A Comparison of the Parameter Estimates of Individual Level Variables in the Fertility Model Generated by a 'Naïve' Probit Model not taking Endogeneity into Account with those From a Bivariate Probit: Year-by-Year Analysis (Continued).

	1998		1999		2000	
	Naïve Model	Bivariate Probit	Naïve Model	Bivariate Probit	Naïve Model	Bivariate Probit
Age	0.142	0.155	-0.155	-0.141	-0.185	-0.160
	(0.138)	(0.135)	(0.133)	(0.121)	(0.154)	(0.151)
Age^2	-0.003	-0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Migration Status						
Was Migrant (dummy)	0.057	0.382	0.212	0.508	0.301	0.694
	(0.185)	(0.394)	(0.176)	(0.357)	(0.197)	(0.406)*
Migration Experience						
Time in Urban	-0.011	-0.021	-0.013	-0.024	0.002	-0.011
	(0.010)	(0.015)	(0.010)	(0.014)*	(0.010)	(0.016)
Occupation						
Agricultural (reference)						
Construction	-0.734	-0.810	-0.003	-0.064	0.041	-0.044
	(0.384)*	(0.369)**	(0.269)	(0.270)	(0.332)	(0.336)
Other Non-Agricultural	-0.119	-0.165	-0.249	-0.293	0.017	-0.036
	(0.148)	(0.139)	(0.142)*	(0.139)**	(0.166)	(0.178)
Not in Labor Force	0.287	0.240	0.042	0.019	0.171	0.129
	(0.227)	(0.209)	(0.230)	(0.222)	(0.268)	(0.248)
Education						
Education Level	-0.014	-0.013	0.034	0.032	-0.006	-0.009
	(0.031)	(0.027)	(0.027)	(0.025)	(0.035)	(0.027)
Family Formation Stage						
Parity	-0.127	-0.119	-0.475	-0.470	-0.014	-0.014
	(0.183)	(0.145)	(0.171)***	(0.133)***	(0.289)	(0.245)
Parity^2	0.007	0.005	0.047	0.045	-0.041	-0.042
	(0.044)	(0.028)	(0.026)*	(0.016)***	(0.093)	(0.079)
Years Since First Marriage	-0.067	-0.069	-0.036	-0.038	0.012	0.012
	(0.035)*	(0.033)**	(0.032)	(0.030)	(0.038)	(0.037)
# Previous Intervals	-0.419	-0.409	-0.289	-0.283	-0.439	-0.429
	(0.131)***	(0.112)***	(0.130)**	(0.138)**	(0.188)**	(0.181)**
Constant	-1.204	-1.418	1.173	0.968	1.647	1.211
	(1.778)	(1.719)	(1.720)	(1.548)	(2.021)	(2.010)
Rho Wald Test X^2		0.345		0.346		0.254
N	1385		1412		1440	

Note: Robust Standard errors in parentheses * p<0.10, ** p<0.05, ** p<0.00

CHAPTER FOUR: THE LEGACIES OF CONTEXT: PAST AND PRESENT INFLUENCES ON CONTRACEPTIVE CHOICE IN NANG RONG, THAILAND.

The relationship between individual behavior and social, cultural, and economic context plays an important role in most theories of social and demographic change, both classical and contemporary. A substantial body of literature has examined the effects of meso-level contextual variables, such as neighborhood or community characteristics, on a variety of individual behaviors, both demographic and social. Among the demographic outcomes these studies have examined are transition to sexual activity (e.g. Brewster, Billy and Grady 1993), adolescent sexual activity (e.g. Upchurch et al. 1999), the transition to marriage (e.g. South and Crowder 2000), mortality (e.g. LeClere, Rogers and Peters 1998; Smith and Waitzman 1997), contraceptive adoption and use (e.g. Entwisle, Casterline and Sayed 1989; Entwisle et al. 1984), migration (e.g. Boyle and Shen 1997), and fertility behavior (e.g. Montgomery and Casterline 1996). However, a number of questions remain as to the ways in which this relationship may change over the life course, or in settings of rapid social and/or economic change, despite the clear implications these have for behavior. Recent research has extended this approach to include a consideration of the role of both past and present context in shaping individual behavior (Axinn and Yabiku 2001; Wheaton and Clarke 2003; Yabiku 2004). In this study, I draw on the theoretical insights provided by the life course perspective (Elder 1977, 1983; Elder [1974] 1999; Rindfuss 1991) to further develop this literature, focusing

on how the intersection between context and individual life experience influences use of modern contraception in a context of rapid social and economic change.

Although the importance of contextual factors for contraceptive behavior is well established in the literature on contraceptive use (e.g. Entwisle et al. 1996; Entwisle et al. 1997; Freedman 1997), the focus of this has been primarily on the effects of current context, largely ignoring the potential role of past context. The lack of attention given to past contextual influences is significant for both theoretical and empirical reasons. From a theoretical standpoint, failing to take into account past context in effect treats current context as "de novo", ignoring they ways in which past context and history have shaped current context. This is true of both the social, economic, and demographic context and of individuals themselves. For example, Entwisle et. al. (1996) find that contraceptive behavior in communities is strongly influenced by the experiences and preferences of the first adopters of contraception. The choices made by these individuals continued to influence behavior years later by affecting the information available to each group of new users in the community. At the individual level, a number of theoretical frameworks explaining behavior over the life course have also emphasized the ways in which past decisions may also have persistent effects on behavior by establishing preferences and habits. These include theories of socialization, habit formation (e.g. Becker 1996; see Camic 1986 for a review of the role of habit in sociological theory), and social psychological development (e.g. Shanahan, Sulloway and Hofer 2000; Wheaton and Clarke 2003). Empirically, failing to account for past context in models of current behavior introduces the possibility of omitted variable bias, as past context may influence both present context and behavior directly and indirectly. Recent research based on

longitudinal data at multiple levels of analysis has found significant effects of past context on current behavior (Axinn and Barber 2001; Axinn and Yabiku 2001; Wheaton and Clarke 2003), further reinforcing the value of approaches that emphasize the role of both individual and contextual factors over time. This is particularly important in settings where social and economic contexts are relatively fluid, such as in areas going through the rapid social and economic changes inherent to the development process. One aspect of individual experiences that is particularly relevant to this study is the role of migration, which is also typically not fully accounted for in analyses of the effect of context on behavior. This is important because migration implies that the individual is exposed to an environment that may be very different, potentially changing the way which their behavior is shaped by the context in their origin location.

One of the main reasons the role of past context has not been fully addressed in this literature is that the majority of research in this area has relied on cross-sectional research designs and data at limited levels of analysis. While datasets that have longitudinal information at the individual level have become increasingly common, very few studies in this area have been able to draw on longitudinal data at the community level as well. This greatly restricts the ability of these studies to fully explore the diversity of ways in which both contextual and individual circumstances change over time, and how this is related to individual behavior. The use of cross-sectional data is particularly problematic, as it makes an assessment of the role of contextual change impossible, meaning researchers must rely on differences between the behavior of individuals in different contextual environments to draw inferences on how contextual change may shape behavior. The assumptions this implies are particularly problematic in

settings where change is both commonplace and rapid, such as in societies experiencing the social and economic changes associated with the development process. Furthermore, the use of cross-sectional data limits the ability of researchers to explore how the behavior of individuals differs according to experiences with contexts other than the one captured by the cross-section of time when the data was collected. As a result, studies based on this type of data typically implicitly assume equal exposure to context among individuals, ignoring the role of migration into or out of different contextual environments. While the use of retrospective data addresses some of these concerns, these data are typically limited to information on the timing of events, such as the introduction of family planning programs, and as such are not able to provide a detailed picture of past context. In particular, these data typically do not include information that is difficult to collect retrospectively, such as contraceptive prevalence rates or general characteristics of community populations. A further issue with the use of retrospective data relates to the effect of selection into the population of interest. Because these data are collected from a select subsample of the total population present at previous time points, they may not be fully representative of this population. This means that accurate inferences of the effect of past social or demographic environments cannot be reliably made using this type of data.

This study explores the relationship between village context, both past and present, on women's contraceptive decisions in Nang Rong, a rural district in Northeast Thailand, focusing on use of both temporary and permanent contraception. In particular, this research focuses on how current contraceptive use is influenced by community contraceptive environment, indicated by village contraceptive prevalence levels, both

current and during the young adult years, and how this in turn is influenced by experience with migration to urban areas. This approach implies a more complex conceptualization of the role of contextual influences on behavior than is typical in the literature on contraceptive choice, allowing for a more complete assessment of how individual life histories and contextual influences intersect to shape behavior.

This study takes advantage of a unique longitudinal dataset collected on individuals, their households, and communities in Nang Rong at three time points over a period of sixteen years between 1984 and 2000 to explore these issues. This period was one of dramatic social, economic, and demographic change in the region, and Thailand as a whole, providing an ideal setting for examining the ways context influences individual behavior from a life course perspective. These data represent a significant improvement over those used in the prior research in this area, as they are both longitudinal and prospective, allowing for a more comprehensive assessment of how both individual and contextual factors influence behavior. In contrast to prior research, I am able to construct detailed measures of both past and present context based on data that include the entire community, providing a rich picture of change at the individual, household, and community levels. In addition, I am able to take advantage of the prospective nature of the data to explore the ways in which the influence of past context on behavior is contingent on individual experiences with migration to urban areas, a significant advance on prior research.

Nang Rong is a particularly interesting setting in which to explore the role of context in shaping contraceptive behavior. In contrast to the majority of rural areas in the developing world, Nang Rong was in the final stages of the fertility transition by the

midpoint of this study period, with correspondingly high levels contraceptive use. While contraceptive use was also comparatively high by this point, this was also a relatively new development, with contraceptive use in the region lagging behind national averages for most of the period covered by the study. As a result, women beginning the process of family formation during this period did so against a backdrop of constant change in most aspects of their contraceptive environment. This has a number of implications for the ways in which these women may be influenced by both past and present context. While the scale and speed of these changes is unusual even by the standards of contemporary demographic transitions, the general patterns of change are common to many rural areas throughout the world, virtually all of which have seen declines in fertility and increased use of modern contraception. As a result, the findings of this study are able to contribute to our understanding of the determinants of changes in both fertility and contraceptive behavior in a variety of settings, particularly those where fertility has already declined significantly. The results of the analyses suggest that in this setting contraceptive choices are influenced by community context, particularly current context, although past context also plays a role in shaping behavior. In addition, these analyses indicate that the effect of past context is mediated by individual life experiences, particularly with migration to urban areas.

Literature Review

The decision whether to use contraception is typically regarded in the contraceptive use literature as reflecting a variety of needs and concerns, involving a complex decision-making process where method effectiveness, availability, possible side

effects, and convenience of use are all important factors. Potential users must also weigh the possible social, psychic, and economic costs of controlling fertility, each of which are dependent on the broader social and cultural context within which the decision is made. The influence of these contextual factors on individual behavior is exerted primarily through two mechanisms: institutional and social effects (Behrman, Kohler and Watkins 2002; Kohler 1997; Kohler, Behrman and Watkins 2001; Montgomery and Casterline 1996).

Institutional effects both enable and constrain individual behavior through defining local opportunity structures. With regard to contraceptive use, these have a direct effect through shaping the accessibility and availability of contraception, both of which play a pivotal role in shaping individual contraceptive decisions (e.g. Degraff, Bilsborrow and Guilkey 1997; Entwisle et al. 1984; Entwisle et al. 1996; Entwisle et al. 1997; Freedman 1997). Institutional effects may also affect contraceptive behavior indirectly by establishing social and economic conditions that either increase or decrease the opportunity costs associated with contraceptive use.

In contrast, social effects mainly influence behavior through two interrelated processes: social influence and social learning. Social influence shapes behavior primarily through defining a normative context that defines socially acceptable behavior. The power of this process lies in either hierarchical power structures or social institutions that delineate and enforce the social costs and benefits associated with a given behavior or set of behaviors (Mason 1983). Social learning refers to the ways in which individual social networks influence the spread and adoption of new behaviors, particularly in environments where information on innovative social and economic behavior is limited.

In these contexts, social networks play a central role in the diffusion of information on new behaviors, allowing individuals to more effectively evaluate the costs and benefits of adopting particular behaviors (Behrman et al. 2002; Montgomery and Casterline 1996). Both of these processes imply that women in contexts where the 'contraceptive culture' is strong and contraceptive use is commonplace will be more likely to use contraception than those in settings where contraceptive use is less prevalent or socially less acceptable. In addition, individuals will be more likely to know more about contraception, and be more receptive to its use, if others in their network of social interaction either approve of or use contraception (Behrman et al. 2002; Kohler 1997; Kohler et al. 2001).

While both institutional and social effects are conceptually independent processes, it is likely that in most cases individual behavior is shaped by both simultaneously, as each potentially affects the other. Insofar as institutions are socially constructed, they are subject to normative pressures that make them more or less accepting of new ideas or methods. In the case of contraception, social norms and political pressure often play a role in determining the placement of health care centers and the variety of contraceptive services they provide. On the other had, institutions such as modern health care centers or schools may also play a major role in encouraging social change, including changes in the perceptions of the costs and benefits of childbearing (Caldwell 1982) and fertility preferences (Freedman 1997). In addition, these institutions may also contribute to further social and demographic change by taking over a number of tasks and functions traditionally considered the domain of the familial unit, lessening the overall influence of the family on individual behavior (Axinn and Barber 2001; Axinn and Yabiku 2001).

Applying the life course framework to the study of contraceptive behavior implies a more complex relationship between context and behavior than has typically been taken in prior research (notable recent exceptions to this are: Axinn and Barber 2001; Axinn and Yabiku 2001). Three fundamental concepts outlined by this framework are particularly relevant to the examination of contraceptive choices. The first is that the effect of both individual and contextual influences on contraceptive behavior is contingent on the point at which individuals are in their personal life course. As a result, contraceptive needs vary with life course and family formation stage, moving from being focused primarily around issues of timing and spacing to being oriented primarily towards fertility limitation (Rindfuss et al. 1996). Secondly, behavior at any given point in time reflects both accumulated experiences and current influences on behavior, including broader contextual factors. This implies that past experiences and contexts, such as the environment where childhood socialization took place, continue to exert some influence on behavior throughout life, attenuating the effect that current personal and contextual circumstances may have. However, this also implies that the strength with which past context influences current behavior is contingent on individual experiences in the interim period. While a number of individual experiences may influence how past context influences behavior, this paper focuses on migration, which exposes individuals to different environments and may lead to lasting changes in behavior. Lastly, the influence of past context on current behavior varies according to the life stage at which it is experienced, suggesting that certain life stages are particularly important in shaping behavior (Duncan and Brooks-Gunn 1997; Krein and Beller 1988; Massey 1998). In terms of contraceptive use, contextual influences are likely to have the greatest long-term

impact at points in the life course where both fertility and contraceptive preferences are shaped.

One such point is in early adulthood, a particularly 'dense' life course stage in terms of both demographic and social behavior (Rindfuss 1991). As young men and women enter adulthood and begin the family formation process, they are likely to face considerable uncertainly regarding contraceptive use. As a result, they are particularly sensitive to both institutional and social influences on contraceptive behavior, drawing from both formal and informal sources of information to aid their contraceptive decisions. This suggests that the characteristics of local community networks are particularly important determinants of behavior at this stage, implying that couples in villages where contraceptive use is well established will be more likely to adopt contraception themselves.

The implications of this for contraceptive use in the long-term are not well established. While the empirical evidence is limited, the normative and cultural frameworks for behavior established during the socialization process are thought to have enduring effects in adult life (Axinn, Clarkberg and Thornton 1994; Axinn and Yabiku 2001; Campbell 1969; Chodorow 1978). Although the effect of contraceptive socialization in early adulthood is likely to be less durable than childhood socialization, it is likely that it continue to exert some influence on behavior. In addition, contraceptive decisions made during early adulthood may continue to influence decisions at a later point through the development of preferences and habits (Becker 1996), or through altering the sequencing of life course events.

The influence of past context on current behavior may also be felt as a result of the relationship past context has with current context. This relationship is likely to be quite strong even in settings where there has been significant contextual change, as patterns established at one point in time 'set the stage' for patterns at a subsequent point. Entwisle et al. (1996) find that contraceptive patterns in Nang Rong communities are strongly influenced by the contraceptive preferences and experiences of early adopters, even when contraceptive use has been well-established and a variety of choices are available. However, the strength of these effects relative to the influences of current context is unclear. At the conceptual level, a number of theories describing fertility, and by extension contraceptive behavior, implicitly argue for stronger effects of current context. This is particularly true for neoclassical microeconomic theories of fertility change (Becker 1981), which emphasize the role of costs and benefits of childbearing in shaping fertility behavior. While these theories for the most part are silent with regard to the role of contextual factors (Mason 1997), the implication is that individuals make decisions based primarily on the basis of an ongoing assessment of the costs and benefits involved[31].

There are also a number of practical reasons to expect the effect of current context to outweigh that of past context. Contextual changes over the life course or life course stage may place limits on the expression of preferences developed at earlier stages of the life course (Shanahan 2000). Examples of this could be the withdrawal of family planning programs or dramatic shifts in economic conditions. Furthermore, life

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[31] Important exceptions to this are the works of Easterlin (1987), which emphasizes the role of childhood environment in shaping fertility preferences through the establishment during childhood of perceived economic opportunity structures, and recent work in economics on tastes (Becker 1996) that emphasizes the longevity of established tastes and preferences.

experiences potentially play a key role in the degree to which past context influences contraceptive behavior, either through changing preferences or altering the associated costs and benefits. One particularly important life experience in terms of past contextual influence is migration, which exposes individuals to a different set of contextual influences, particularly when the migration is between rural and urban areas. The change in context may also signify a change in the prevalent contraceptive environment, with migrants potentially having both first-hand experiences with a range of different contraceptive behaviors and access to information on contraception that is not available in the sending community. A large body of literature has documented the ways in which migration influences fertility (e.g Goldstein, White and Goldstein 1997; Lindstrom and Saucedo 2002; Massey and Mullan 1984), with the implicit assumption that this involves changes in contraceptive behavior, particularly when moving from an area where contraceptive use is low to one where use is high. As a result, the effect of past context on contraceptive behavior may be weaker for migrants than for non-migrants. However, the effect of this is less clear in this context, where fertility levels have become increasingly closer to those of urban areas over time. As a result, migrants in the early 1980s were likely to encounter greater differences in fertility behavior when migrating than those migrating a decade later. This implies that the key factors in how this affects fertility and contraceptive behavior are the period and life course stage at which migration took place.

Recent research in rural Nepal has found evidence that both past and present context may influence contraceptive behavior (Axinn and Barber 2001; Axinn and Yabiku 2001). While the evidence from these studies is limited and based in developing

countries only, this research has found that exposure to non-family institutions such as schools or markets during both childhood and adulthood affects contraceptive use independently. These results suggest that institutional and social factors influence behavior differently at distinct points in the life course. However, while these studies provide important insights into the ways in which community context influences contraceptive behavior, they do not directly examine the effect of levels of contraceptive use at the community level, an important indicator of the prevailing contraceptive environment. In addition, while both of these studies examine the role of individual experience in shaping contraceptive decisions, neither addresses the effect of migration on this relationship in a comprehensive way[32], potentially overlooking an important factor in the context-contraceptive behavior relationship.

In this paper, I further extend this research by explicitly examining the role of past and present community context in shaping contraceptive use, while also taking into account the role of migration experience in urban areas. This research contributes to both the literature on contraceptive use and the broader sociological literature the influence of contextual factors on individual behavior. In contrast to other research in this area, I include a range of contextual variables that measure both institutional and social influences on behavior. Including both past and present levels of contraceptive use allows a more precise examination of how community norms regarding contraception, both past and present, shape contraceptive behavior. Furthermore, this study uses a much more precise definition of community than has often been the case in studies of

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[32] Axinn and Yabiku (2001) include a limited history of migration experiences in their analyses, and tested for the effects of excluding different types of migrants from their analysis (see p. 1253-1254 for a description of this). However, the migration variables included (a control for being a current migrant, a dummy variable indicating migration before first birth, and whether the respondent was currently living with their spouse) capture only a portion of the cumulative migration experience women may experience.

contextual effects, focusing on individual villages and therefore more effectively capturing the social and institutional factors influencing individual behavior. Finally, I take advantage of the prospective design of the data to explore the effect of migration on the influence of past context on current behavior, a major issue given the prevalence of migration both in this context and throughout the developing world.

Empirical Expectations

The preceding discussion suggests a number of competing explanations for contraceptive behavior which guide the empirical analysis in this paper:

1. Dominance of past context: Women's contraceptive behavior is influenced primarily by past contextual influences, even while controlling for present individual, household, and community contexts. This would support arguments for the dominance of socialization and early preference formation in shaping behavior.

2. Dominance of current context: Contraceptive behavior is influenced primarily by current context. This would support approaches that posit an on-going decision-making process dominated by current individual and contextual factors.

3. Dual importance of past and present context. This hypotheses argues that both past and present contexts matter for behavior. This would support the life course approach taken in this paper, and also imply that the effect of both past and present context is influenced by individual life experiences, including migration.

Setting

The setting for this study is Nang Rong, a relatively poor district, largely agricultural district in Northeast Thailand. Over the past three decades, Nang Rong has been in the midst of a fundamental economic, cultural, and social transformation. Within the space of a generation, virtually every aspect of the environment within which behavior takes place has changed, often dramatically. Largely unsettled until the early part of the 20th century, the Northeast became an important agricultural frontier in the early 1950s, triggering a period of sustained in-migration from other areas in Thailand, aided by the construction of rail and road networks into the area. By the 1970s, settlement had slowed sharply, and migration patterns reversed, with the Northeast becoming a major source of migrants to Thailand's booming urban sector, establishing a pattern that would continue for the remainder of the century. As is typical for Thailand as a whole, much of this migration has been circular in nature, with migrants following a seasonal migration pattern characterized by repeated short stays in urban areas (Fuller 1990; Fuller, Lightfoot and Kamnuansilpa 1985; Guest et al. 1994). Migration has become somewhat of a rite of passage for young men and women in Nang Rong, with most young men and women having some experience of recent migration (Alva and Entwisle 2002). Contributing to this process has been a gradual deemphasizing of the local agricultural sector of the economy, with gradual declines in the proportion of the workforce at younger ages engaged in agricultural labor, particularly among women, although the overwhelming majority of the residents of Nang Rong remained employed in agriculture (Alva and Entwisle 2002). While the economic crisis Thailand experienced

during 1997/1998 had some effect on these patterns, there is little evidence of a long-term

shift away from these established patterns.

The past three decades have also been a period of remarkable changes in fertility

levels throughout the region, declining from an estimated fertility rate of over seven

births per women in the late 1960s (Knodel, Chamratrithirong and Debavalya 1987) to

2.19 by 1989 (Hirschman et al. 1994) and 2.11 by 1996 (Chamratrithirong et al. 1997).

This change has been accompanied by rapid increases in contraceptive use and

knowledge (Knodel et al. 1987). This was largely the result of a highly successful

government family planning program that aimed at improving contraceptive accessibility

through establishing community health centers where contraception was easily available.

As a result, government outlets were the primary source for contraception for over 80

percent of rural women by the mid 1980s (Chamratrithirong, Kamnuansilpa and Knodel

1986), and continue to play a key role in contraceptive use. While the Northeast had

lower levels of use than rural Thailand as a whole in the 1980s (Kamnuansilpa and

Chamratrithirong 1985), by the late 1990s, contraceptive use in the Northeast among

currently married women of reproductive age was over 70 percent, and increase of over

20 percentage points on the levels in the late 1970s (Chamratrithirong 1998). Research in

Nang Rong also indicates increasing levels of contraception over this period, with over

half of married women of reproductive age using modern contraceptive methods by the

mid-1980s, although prevalence rates varied considerably across the district (Entwisle et

al. 1996). This research also found that contraceptive behavior was influenced

significantly by both institutional and social effects (Entwisle et al. 1996; Entwisle et al.

1997). These changes largely reflect a significant shift in attitudes towards family

formation in Thailand. While this is most noticeable in the emergence of fertility preferences for a two child family structure with one child of each gender (Guest 1999; Knodel et al. 1996), there is also evidence of an upward shift in both age at marriage and age at first birth (Jampaklay 2003), signaling broader changes in Thai society as a whole.

Data and Methods

The data used in this study come from a series of linked surveys conducted in Nang Rong in 1984, 1994, and 2000[33]. In each wave of data collection, information was collected on each individual in every household in 51 1984 study villages[34]. At the individual level, information was collected on a range of demographic and social variables, including contraceptive use. Information on migration experiences was gathered through the use of retrospective life histories, providing a detailed picture of individual exposure to urban social and contraceptive contexts. In addition, detailed information on community and household characteristics was also collected at each point in time, allowing for a view of the changing context within which individuals lived over this period.

This data is particularly well suited to the application of a life course approach to understanding contraceptive use patterns. Individuals are both linked to households and communities in each wave of data collection, and over time through the use of detailed

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[33] For more information on this project, see http://www.cpc.unc.edu/projects/nangrong_home.html.

[34] In this study, the geographical boundaries defining the village context reflect local administrative boundaries. Due to administrative subdivisions, the original 51 villages had grown to 76 in 1994, and 92 in 2000. In order to ensure a consistent definition of 'community' over time, villages that split were re-combined to their original villages. The construction of all the community variables in the analyses was based on these reconstituted villages. In the cases where distances are involved, the average distances for the split villages was used in the analyses.

identification information[35]. In addition, the information on the characteristics of the communities in which individuals lived is extremely detailed, reflecting the fact that a complete census of each village was conducted in each wave of the data collection. This enabled the construction of a variety of measures of social and demographic context based on information collected at the individual level. I take advantage of this to examine the role of both past and present context on contraceptive behavior, first individually, and then in concert with each other.

The analysis is conducted in two parts. In the first, I focus on the role of context in shaping the decision to use a temporary contraceptive method, while in the second I focus on the decision to use a permanent method. While prior research has often modeled both sets of methods simultaneously, this obscures significant differences involved in the decision-making process attached to each form of fertility control. In addition, because the decision to use a permanent method obviates the need to take further contraceptive decisions, including both in a model predicting contraceptive choice at a subsequent point makes little substantive or statistical sense. The substantive focus in both cases is on the role of the prevailing community 'contraceptive culture' during the teen and early adult years in shaping current behavior, controlling for current contraceptive culture. As implied by the life course approach, this requires a simultaneous consideration of the effects of both past and present contextual influences, in addition to some information on individual experience in the interim. To do this, I use information from multiple waves of data collection, restricting the analyses to those

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[35] Individuals were tracked through their household membership. Households were tracked over time, resulting in relatively high rates of sample retention (Of the 5860 in the 1984 wave of data collection, 5258 households were successfully tracked between 1984 and 2000 (90%). 5050 households were successfully tracked throughout the entire period studied (86%).

women aged 15-23 in 1984, who were aged 25-33 and 31-39 in 1994 and 2000 respectively, and who were present in the village in both 1984 and 2000[36]. The selection of this age range allows women to be tracked through multiple stages of their life course, allowing for the examination of the ways in which current behavior is influenced by contextual influences at different stages of the life course. In total, 1739 of the 3575 (49%) women aged 15-23 in 1984 were present in the village during the 2000 data.

The decision to restrict the analysis to this group is based on a number of factors. Firstly, these ages capture two distinct, but equally important, stages in the life course. In 1984, these women were in their early teens to early adulthood, ages when they would have first have been exposed to ideas about contraception. In addition, these are the key ages at which women in this context both initiated migration to other areas (Knodel, Chamratrithirong and Debavalya 1986; Richter et al. 1997) and began the process of family formation through marriage (Jampaklay 2003). As established in Chapter Three, these processes are closely related in this context, suggesting that this period is a particularly important point in the life course. By 2000 virtually all of these women would have married and had children, making fertility control an increasingly important issue, particularly with regard to permanent methods. Prior research in Nang Rong has found that sterilization is closely related to an individual's remaining years of anticipated

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[36] The restriction of the sample to women who were present in their home villages in both 1984 and 2000 raises the possibility of biased results due to sample attrition. Attrition may take place for a variety of reasons, but of greatest concern in this context is the attrition due to migration. The peak ages of migration for women in Thailand in the 1980s were between the ages of 15 and 29 (Fuller 1990), which include those used in the analysis. As a result, the analyses are effectively restricted to those women who had *not* already migrated from the village. Much the same applies to the process of return migration. The effect of these process on the estimates is unclear, with prior research has found that sample attrition typically does not result in biased coefficients (see Behrman, Kohler, and Watkins 2002, Footnote 4 for a more complete discussion of this issue). In order to examine the issue of selectivity more closely, I estimated a model predicting inclusion in the sample (See Table A4.3 in the Appendix). Women who were younger in 1984, with an agricultural occupation, not divorced or separated, and from poorer or larger households, and from villages with less women in non-agricultural jobs were more likely to be included in the sample. Subsequent statistical tests for selection effects (not shown) showed no selection effects for these analyses.

need for contraception, which is indexed by age in their analysis (Rindfuss et al. 1996).

In addition, given the age range covered, it is likely that many of these women would

have had at least some experience with migration to urban areas, providing an ideal test

of the ways in which individual experiences may influence the relationship between

context and contraceptive behavior[37].

　　　　While both the analyses of temporary and permanent method use include women

within the same age range, there are a number of important differences between the two.

The sample used for the analysis of temporary methods includes only non-sterilized, non-

pregnant women who were married in 2000, with the analysis focusing on the role of

community variables in 1984 and 2000 in shaping behavior in 2000. In contrast, the

analysis of permanent methods includes only women who were non-sterilized in 1994,

married in both 1994 and 2000, with the focus of the analysis being on the role of 1984

and 1994 community variables on the decision to become sterilized between 1994 and

2000. After excluding cases with missing values, 1019 and 958 women were included in

the analyses of temporary and permanent contraceptive use respectively[38].

　　　　The modeling strategy followed in this study is the same for both the analysis of

temporary and permanent contraceptive use. I begin by estimating a model including

only past community context, controlling for current individual and household

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[37] However, it is important to keep in mind that in the analyses in Chapter Three return migrants behaved very similarly to non-migrants in terms of fertility. As a result, the effect of migration experience may be understated in the empirical analyses, as current migrants were not included in these analyses.

[38] The exclusions for the analysis of temporary methods included: 272 women not married in 2000; 49 women who were currently pregnant in 2000; 339 women who were sterilized in 2000; and 60 women who had incomplete information on one or more of the variables included in the analysis. The exclusions for the analysis of sterilization include 162 women who were sterilized prior to 1994, 305 women who were not married in 1994, 272 women who were not married in 2000; 49 women who were currently pregnant in 2000; and 23 women who had incomplete information on one or more of the variables included in the analysis.

characteristics. I then add current community context, therefore including both past and

present context simultaneously[39]. By doing this, I am able to explore the degree to which

the effects of current context on behavior are a reflection of the influence of past context,

and examine the role of past context more effectively. Finally, I include an interaction

between past community contraceptive context and months spent as a migrant in urban

areas in order to examine the role of individual experiences on the influence of past

context. This allows me to explore how the effect of urban experience varies between

individuals with different backgrounds in terms of community contraceptive use. In both

analyses, the dependent variable is a binary variable indicating use of either temporary or

permanent contraception, modeled as the outcome of individual, household, and

community variables, both past and present. The statistical model used is a logistic

regression of the form:

$$\Pr(y_i = 1 \mid x_i) = \frac{\exp(x_i\beta)}{1 + \exp(x_i\beta)}$$

Parameter estimates are obtained using maximum likelihood procedures, using the

Huber/White/Sandwich robust estimate of variance to correct for the effect of clustering

at the village level (StataCorp 2001). In order to establish whether the estimates

produced by these models were subject to selection bias resulting from sample attrition

over the period studied, a Heckman probit analysis for sample selectivity was done for

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[39] Including both past and current context raises a further issue of both substantive and methodological
concern – that of the correlation in community characteristics over time. Examining the correlations
between variables indicated that only the variables closely tied to infrastructure (distance to health centers
and hospitals, and whether the village had a school) were problematic, and are included in the models using
their 2000 values. A subsequent test for multicollinearity showed the variables included fell well within
conventional limits for multicollinearity.

both sets of analyses (Heckman 1979), which indicated that the results were not influenced by sample selection in either case[40].

A number of substantive and methodological concerns guided the selection of variables used in these analyses. While the focus of this paper is primarily on community effects, a number of individual and household level variables shown to influence contraceptive behavior are also accounted for. The individual level variables included are: life course stage (measured by age and years since first marriage); completed years of formal education; occupation; whether the spouse is currently living in the same household; and migration experience, measured as the number of months spent in and urban location between either 1984 and 2000 or 1984 and 1994[41]. Although current parity clearly may influence contraceptive use patterns, I do not include it in the analyses due to concerns about endogeneity (for a discussion of this issue, see Rindfuss et al. 1996)[42]. The household variables included in the analyses are: two measures of household socioeconomic status (household wealth, the education level of the most

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[40] In both cases, the selection equation included individual information from 1984 that was not included in the eventual analyses equations, which act as instruments in this context. The procedure used was svyheckprob in STATA, with the athrho values both statistically insignificant.

[41] In each year respondents were asked to list all the locations they had lived in for two or more months, with a maximum of six residences per year. However, there was no information on exactly how long was spent in each residence. In order to create an estimate of months spent in urban areas, two approaches were examined. The first divided the year equally between all listed residences (i.e. an individual reporting two residences in a given year was assigned a residence length of six months for each residence). The second approach assigned the minimum of two months to all urban residences, probably undercounting time spent in urban areas (individuals who only reported an urban residence in a year were assigned 12 months in an urban area). The months spent in an urban location between 1984 and 1994 or 2000 were then summed. To explore if these different definitions changed the effect of urban experience in the regression models, both were included separately. The results were very similar, so the more conservative estimate was used.

[42] Subsequent models (not shown) that were differentiated on the basis of current parity were all consistent with the results of the model for all women, suggesting that the process through which past and present context influences behavior does not differ significantly for women at different stages of the family formation process.

educated household member); and two measures of household composition (household size and whether the household contains more than one generation of adults), both of which may contraceptive use through creating an environment where pressures to adopt particular fertility behaviors (see Rindfuss et al. 1996 for an illustration of the effect of having grandparents in the household on contraceptive behavior in this context). The analysis of sterilization includes two additional variables: whether the woman was a migrant in 1994, and a count of the number of temporarily absent household members in 1994. When used in the analysis of temporary method use, all of these variables were measured in 2000, while in the analysis of permanent method use they were measured in 1994.

In selecting the community variables included in the analysis, we follow the criteria of Entwisle et al. (1996), including those variables that 1) have an established impact on contraceptive and fertility decisions, either through institutional or social effects; and 2) vary sufficiently between villages to show a significant empirical impact. The variables included are: three measures of village infrastructural development - whether the village had a school, which captures the effect of greater education on fertility and contraceptive behavior, and distance in kilometers to the nearest hospital and health center, which are indicators of access to contraceptives; three measures of village socio-economic development –the percentage of women with non-agricultural occupations, the percentage of women with compulsory education, and the percentage of teens aged 13-18 currently enrolled in school, each of which are indicators of the community's exposure to the modern economy and society; and the proportion of married women aged 15-45 currently using temporary, permanent, or no method of contraception,

which acts as an indicator of the prevailing contraceptive environment. With the exception of the distances from the village to health centers or hospitals, the analyses include both current and past measures of these variables[43]. The analysis of temporary contraceptive use draws on information from both 1984 and 2000, while the analysis of permanent contraceptive use draws on information from 1984 and 1994. Women from villages with a higher level of infrastructural development (having a school and closer to health centers and hospitals) are expected to be more likely to use contraception, as are women from villages with higher levels of socio-economic development (greater proportions of women with non-agricultural occupations and compulsory education, and a higher percentage of teens in school). The general expectation for the effect of the level of contraceptive use in the village is that women from villages with higher use levels will be more likely to use contraception themselves. The descriptive statistics for these variables are shown below in Table 4.1.

With the exception of the measures of infrastructural development, which were highly correlated over time, these figures confirm the degree of change that has taken place in Nang Rong over the period covered by this study. There is clear evidence of rapid socio-economic development, and marked increases in the proportions of women using contraception. It is interesting to note that the proportions of women using modern contraception are much lower in 1984 than in either 1994 or 2000, suggesting that the 1984-1994 period was particularly important in terms of shifting patterns of contraceptive use. The greatest increases have been primarily in levels of use of temporary methods of

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[43] In the case of the analysis of temporary contraceptive use this was 1984 and 2000, while for the analysis of permanent method use this was 1984 and 1994. An examination of the correlation between past and present infrastructural development showed these to be highly correlated. As a result, only the infrastructural characteristics of the village from 2000 were included in the analyses.

contraception, with the use of permanent methods remaining relatively stable over the period covered.

Results and Discussion

The results of the multivariate analysis of the determinants of temporary and permanent contraception are shown in Tables 4.2 and 4.3 respectively. There are a number of results of note in both tables. However, in keeping with the focus of this study, the discussion of results is restricted primarily to those individual level variables related to the life course, the community level measures of community development and contraceptive environment, and the interaction between urban experience and community contraceptive prevalence. With few exceptions, the individual and household level control variables performed as expected (Tables A4.1 and A4.2 in the Appendix present the complete results of the regression analyses, including all household level variables).

In comparing the two analyses, it is interesting to note that significantly fewer variables were statistically significant in the analysis of sterilization between 1994 and 2000. This is surprising given the predictive ability of these same variables in the analyses of temporary method use. Rindfuss et. al.(1996), also using data from Nang Rong, suggest that the women who select sterilization as their contraceptive method represent two distinct groupings of contraceptors: successful contraceptors who have satisfied their childbearing goals, and unsuccessful contraceptors who are seeking a permanent contraceptive solution. Many of the variables used to predict sterilization can be expected to act in opposite directions for these groups, diluting their predictive ability. Nonetheless, while care must be taken in comparing the results of the analyses for

temporary and permanent contraceptive use because they are drawn form different samples, the results suggest that both are subject to the same general processes, although with a number of important differences.

The direction of the effects of the individual life course variables included in the analyses generally was as expected, although the effect of these differed between the analyses of temporary and permanent methods. As expected, temporary method use was more likely for younger women and those women whose spouse was currently resident in the household, suggesting that the pattern of circular migration involving repeated spousal separation prevalent in Nang Rong may play an important role in shaping short-term contraceptive behavior. In contrast, the only life course variable that had a statistically significant effect on the sterilization decision was the years since first marriage, which was statistically insignificant in all models of temporary use. While this does not necessarily imply that family formation stage does not influence the use of temporary contraceptive methods, it does suggest that it does have a greater influence on the sterilization decision.

The role of urban experience also differs for the two processes, with only temporary method use significantly influenced by time spent in urban areas. However, the direction of this effect is interesting, with urban experience discouraging temporary contraceptive use, a finding at odds with much of the research exploring the effect of migration on fertility and contraceptive use. There are a number of potential explanations for this effect. The most plausible explanation for this is that this reflects the close ties between migration and the family formation process in this context, as discussed in Chapter Three. This suggests that migration may encourage marriage (also see

Jampaklay 2003) which in turn may encourage fertility and discourage contraceptive use, particularly in the short-term. Alternatively, this may be the result of migrants delaying their fertility in order to take advantage of the opportunities available to them in the urban workforce, and who are 'catching up' with their non-migrant peers and are therefore less likely to be using contraception.

It is, however, important to note the potential role of the convergence of fertility and contraceptive environments between Nang Rong and urban areas over the period of the study in shaping this result. Clearly the effect of migration is likely to be less when this is between two areas and/or time periods with similar patterns of demographic behavior, which reduces the effect of migration experience. One implication of this is that migration between Nang Rong and urban areas is less likely to impact behavior if this took place in the mid-to-late 1990s, when contraceptive use was high in Nang Rong, than if this migration took place in the mid-1980s, when contraceptive use was relatively low. This may explain why migration status was found to have relatively little effect on sterilization behavior, as only migration experience between 1994 and 2000 was included in the analyses. However, migration status has a statistically significant effect on temporary contraceptive use in each of the three estimated models, suggesting that migration experience, in combination with life course stage can be an important determinant of behavior if there is sufficient difference between the two time periods or contexts being explored.

Relatively few of the community level variables have a statistically significant effect on behavior in either of the two analyses, although both analyses suggest an interesting role for both past and present context, particularly for that of the contraceptive

environment. The effects of these variables in both analyses are predominantly confined to current context, although the past contraceptive environment influenced both temporary and permanent method use when current context was excluded from the model (see Model 1 in both Table 4.2 and 4.3). The direction of the effect of past context is interesting, with a higher proportion of women using sterilization discouraging the current use of temporary methods while encouraging the current use of sterilization. While this effect disappeared when current context was controlled for, this suggests that the past contraceptive environment may indirectly affect current contraceptive behavior by shaping the character of the current contraceptive environment. This may be through either the development of established contraceptive behaviors that influence longer-term community contraceptive behavior, as suggested by Entwisle et. al. (1996) or by helping to shape the overall cultural environment within which fertility decisions are made.

In the full model for temporary methods (Model 3), only the distance to the nearest health center (measured in 2000), the current percentage of village teens currently enrolled in school, and the current percentage of women using temporary contraception influenced use to statistically significant degree, confirming the importance of current context. The direction of these effects was as expected, with distance from health centers, a key source of temporary contraception, lessening the likelihood of temporary method use, while both the percentage of teens in school and women using temporary methods encouraged use. In contrast, only the current proportion of women using a temporary method influenced sterilization decisions, with the likelihood of a woman becoming sterilized lower in communities with high levels of temporary method use.

The influence of current contextual environment on contraceptive behavior is further illustrated in Figure 4.1, which presents the simulated predicted probability of using either temporary or permanent for three different village contraceptive profiles (low, medium, and high contraceptive use). The profiles are based on use of both temporary and permanent methods at the community level among married women of reproductive age, and the simulations are based on the coefficients generated by Model 3 in both sets of analyses (i.e. the model of temporary method use was used to create the predicted probabilities for use of temporary methods, while the same was done for permanent method use)[44]. As is clear in Figure 4.1, the effect of current contraceptive use levels is different for the temporary and permanent contraception. The predicted probability of a woman using a temporary method increases steadily as the proportion of women using temporary methods in her village increases, suggesting a strong effect of normative environment. The effect on permanent method use is less clear, with the only small differences between the different village profiles. In addition, the predicted probability of use of sterilization decreases slightly as the proportion of contraceptive users in the village increases. Further analysis (not shown) revealed that this decrease was predominantly related to increases in the proportion of women using temporary contraception, with the probability of use changing only slightly when levels of permanent method use were manipulated. This was not the case for temporary method use, which responded positively to increases in the prevalence of both methods. This

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[44] The profiles were constructed based on the patterns of use present in the data. The medium profile was based on the mean value of total contraceptive use for all villages in the sample (permanent and temporary). The high profile was based on the value of total contraceptive use approximately one standard deviation above the medium value, and the low profile one standard deviation below. The proportions using temporary and permanent methods for each of these levels were then used the simulations, which generate the predicted probabilities. The values used were: low use villages: total use 72% (temporary 51%, permanent 21%); medium villages: 78% (temporary 55%, permanent 23%); high use villages: 84% (temporary 54%, permanent 30%).

suggests that permanent method use is more sensitive to alternative contraceptive methods than temporary method use. In some ways, this is not surprising given that permanent methods by definition allow less flexibility in fertility decisions.

A number of potential factors may contribute to the importance of current context relative to past context in this setting. The first relates to the speed of the changes that have taken place in Nang Rong over the period studied, with the economic, social, and demographic landscape changing completely within a single generation. Consequently, individuals were forced to very quickly adjust their behavior to take advantage of the opportunities these changes provided. As a result, the influence of the contextual factors examined in this study on individual behavior is likely to be relatively short-lived, with individuals forced to be adaptable and open to change in both their individual or contextual environments. In a similar vein, macro-level shocks, such as the financial crisis in 1997/1998, which resulted in significant return migration from urban areas and greatly reduced non-agricultural opportunities in both rural and urban areas, may also increase the relevance of current context at the expense of past contextual influences. The women included in these analyses all went through the family formation process during a period of rapid demographic change, particularly with regard to fertility behavior and contraceptive use. In many ways, this has fundamentally changed the way in which women approach the family formation process, limiting the effect of past context.

Although the results of the analyses do not find evidence of a direct effect of past context, the statistical significance of the interaction terms in the analysis of temporary methods, shown in Model 3, suggests that past context may indirectly influence the way

in which urban exposure influences use of temporary methods. Figure 4.2 illustrates this relationship for the use of temporary contraceptive methods, again using simulated predicted probabilities based on village contraceptive profiles.

The relationship between village contraceptive prevalence and urban migration experience shown in Figure 4.2 is more complex than is implied by either the individual effect of village contraceptive prevalence or urban exposure. While there is little difference between the simulated probabilities of women from villages with different levels of past use with no migration experience, these differences are amplified as migration experience increases. For women from high prevalence villages, migration has little effect on the probability of using a temporary method. However, for those from villages with medium or low levels of contraceptive use, the probability of use decreases as migration experience increases.

This pattern is surprising, as migration experience is typically assumed in the literature to have a positive effect on contraceptive use through changing the fertility preferences of migrants. However, as mentioned previously, this is consistent with the analyses in Chapter Three, which found that migration influences reproductive behavior by encouraging marriage. Alternatively, this may in part be the result of the disruptive effects of migration itself on fertility (see Hervitz 1985; Massey and Mullan 1984), or to the selective nature of migration. Prior research in Thailand has found that rural-urban migration is selective on education and occupation, with individuals with more education and with non-agricultural occupations more likely to migrate for extended periods of time (Fuller 1990). Women with these characteristics are also more likely to delay fertility until later ages. As a result, these women may have delayed their fertility until after the

period of intensive migration was completed, reducing the probability of using temporary contraception following their return to their home village. This implies that their fertility preferences have been not been substantially altered by their experience in urban areas, which is not entirely surprising given the predominantly short-term nature of much of the rural-to-urban migration in this region. In combination with the limits migration may have placed on fertility, this may result in both lower rates of contraceptive use and higher short-term fertility of return migrants as they 'catch-up' on delayed fertility. The effect of this is also likely to be more dramatic for villages where the contraceptive and fertility environments differ substantially from those of the destination.

The relationship between past context, migration, and current behavior may also be influenced by the peculiarities of the process of return migration, particularly with regard to which migrants decide to return. While the statistical tests showed no evidence of selection bias, this process may have an influence on the interaction between migration experience and contraceptive use in this setting. As with out-migration, return migration may selective on a number of factors. These include degree of success in the destination, strength of social ties to both origin and destination, perception of economic opportunities in origin, and socio-demographic factors such as age and education. An additional potential source of selectivity relates to events that take place in the destination, such as marriage. Prior research in Nang Rong found that women who worked in occupations while in the destination where they mixed with people from other regions of Thailand were more likely to marry someone from another region (Jampaklay 2003), which was confirmed by the analyses in Chapter Three. Because it is common in Thailand for the husband to move to the home of the wife, the contraceptive decisions of

these couples may reflect the contextual background of the husband, potentially diluting the effect of the woman's past context.

Conclusion

This study contributes to the literature on the relationship between broader contextual factors and individual contraceptive behavior by exploring the role of both past and present context, and extends this further to examine how this is influenced by personal experience, with a particular focus on migration to urban areas. I am able to take advantage of a unique prospective longitudinal dataset, which allows for the development of a more comprehensive picture of change at both the individual and community levels over time, an important advance on studies that have relied exclusively on cross-sectional or purely retrospective information on individuals and communities. In particular, this allows me to explicitly examine the role of migration in this process, which provides an ideal illustration of the ways in which the individual and context intersect. In contrast to the majority of the research previously done in this area, an analytical approach based explicitly on the life course perspective is used, which allows for a more complex conceptualization of how the context-individual relationship functions. This approach is particularly relevant to settings of rapid social, economic, and demographic change, as is the case in many societies throughout the developing world.

The analyses conducted in this paper illustrate well the complexity of the relationship between individual behavior and the broader social context within which this takes place. The results show that both past and present context influence behavior,

although in very different ways. While the influence of current context on behavior is relatively direct, that of past context is primarily indirect, influencing behavior over the life course mainly by establishing the foundation for current context. However, the results of the simulations suggest that past context has enduring effects on individual behavior that are not solely through current context. This may be through establishing preferences and tastes in terms of demographic behavior, or by shaping the normative environment related to individual behavior.

These results suggest a number of future directions for research on both the effect of context on individual behavior and on the determinants of contraceptive use in environments of rapid change. Prior research on community contextual and contraceptive use has tended to focus on individual aspects of community context such as access to contraception, largely overlooking the role of the normative environment in shaping behavior. Those studies that have explored this have for the most part been only able to examine the role of current context, which ignores both the role of life course factors and past context. As a result, our understanding of the ways in which context influences behavior generally, and contraceptive behavior specifically, is somewhat fragmentary. This is especially true for developing country settings in which rapid change is commonplace. This research suggests that there is much to be gained from framing these questions within the framework of the life course, which allows for change at both the individual and contextual levels, and that both are important to a holistic understanding of how context and individual experiences intersect to shape behavior.

Table 4.1: Characteristics of Nang Rong Villages Included in Analyses: 1984, 1994, and 2000.

Variable	1984		1994		2000	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Village Infrastructural Development						
Whether village has primary school (0=No;1=Yes)	0.63	0.49	0.53	0.50	0.51	0.50
Distance in kilometers to nearest health center	3.05	2.12	2.86	1.63	2.52	1.73
Distance in kilometers to nearest hospital	15.04	6.09	14.33	5.76	14.41	5.59
Village Socio-Economic Development						
Percentage of women aged 15-45 with non-agricultural occupation	4.29	2.15	10.02	5.99	15.19	7.87
Percentage of women aged 15-45 with compulsory education	40.29	4.57	86.62	6.00	83.03	5.68
Percentage of teens aged 13-18 currently in school	23.21	9.10	45.60	15.41	73.56	13.43
Village Contraceptive Environment						
Percentage of married women aged 15-45 currently using temporary contraception	31.81	10.15	47.30	10.42	53.51	9.51
Percentage of married women aged 15-45 currently using no contraceptive method	43.93	10.15	28.44	9.62	24.08	9.02
Percentage of married women aged 15-45 currently using permanent contraception	24.27	12.57	24.26	6.70	22.41	5.32

Note: Means and standard deviations calculated based on original 51 1984 villages (split villages in 1994 and 2000 are re-combined).

Table 4.2: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Use of Temporary Contraception in 2000 – Non-Sterilized, Married Women Aged 31-40 in 2000: Results from a Logistic Regression (N=1019).

	Model 1		Model 2		Model 3	
Individual Characteristics (2000)						
Age: 31-35 (reference)						
36-40	-0.469	(0.156)***	-0.474	(0.160)***	-0.467	(0.161)***
Education						
Completed Years	-0.048	(0.061)	-0.039	(0.061)	-0.039	(0.061)
Occupation						
Agricultural (reference)						
Non-agricultural	-0.523	(0.186)***	-0.488	(0.195)**	-0.483	(0.190)**
Not in the LF	-0.858	(0.382)**	-0.780	(0.388)*	-0.764	(0.377)**
Marital Experience						
Years Since 1st Marriage	0.023	(0.022)	0.018	(0.022)	0.018	(0.022)
Spouse in HH	1.623	(0.315)***	1.598	(0.325)***	1.671	(0.338)***
Migration Experience						
Months in Urban Location	-0.007	(0.003)**	-0.007	(0.003)**	-0.006	(0.003)*
Community Characteristics						
Village Infrastructural Development (2000)						
Primary School	0.003	(0.127)	0.040	(0.123)	0.011	(0.118)
Kilometers To Health Center	-0.172	(0.045)***	-0.114	(0.040)***	-0.111	(0.039)***
Kilometers To Hospital	0.004	(0.015)	0.005	(0.015)	0.010	(0.014)
Village Socio-Economic Development (1984)						
% Women in Non-Agricultural Occupation	-0.014	(0.046)	0.009	(0.042)	0.000	(0.040)
% Women with Compulsory Educ.	-0.017	(0.018)	0.005	(0.036)	-0.004	(0.035)
% Aged 13-18 in School	0.004	(0.007)	-0.012	(0.010)	-0.011	(0.010)
Village Socio-Economic Development (2000)						
% Women in Non-Agricultural Occupation	---	---	0.008	(0.014)	0.011	(0.013)
% Women with Compulsory Educ.	---	---	-0.024	(0.031)	-0.019	(0.029)
% Aged 13-18 in School	---	---	0.014	(0.007)**	0.014	(0.007)**
Contraceptive Environment (1984)						
% Using Temporary Method	-0.003	(0.008)	-0.005	(0.009)	-0.006	(0.008)
% Using No Method (reference)						
% Using Sterilization	-0.013	(0.006)**	-0.008	(0.009)	-0.009	(0.009)
Contraceptive Environment (2000)						
% Using Temporary Method	---	---	0.047	(0.016)***	0.049	(0.015)***
% Using No Method (reference)	---	---				
% Using Sterilization	---	---	0.026	(0.020)	0.030	(0.020)
Interaction Terms						
Months Urban By 84 % Temporary Method	---	---	---	---	0.001	(0.000)**
Months Urban By 84 % Sterilization	---	---	---	---	0.001	(0.000)**
Constant	0.466	(0.780)	-2.535	(2.328)	-3.459	(2.207)

Note: * p<0.1, ** p<0.05, *** p<0.001. . Numbers in parenthesis are robust standard errors.
All models control for the following household variables: relative household wealth, education level of most educated household member, household size, and if the household had multiple generations of adults.

Table 4.3: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Sterilization between 1994 and 2000 – Women Aged 31-41 in 2000: Results for a Logistic Regression (N=958).

	Model 1		Model 2		Model 3	
Individual Characteristics (1994)						
Age: 31-35 (reference)						
36-40	-0.031	(0.197)	-0.058	(0.199)	-0.116	(0.201)
Education						
Completed Years	-0.036	(0.053)	-0.042	(0.057)	-0.038	(0.058)
Occupation						
Agricultural (reference)						
Non-agricultural	0.340	(0.317)	0.372	(0.305)	0.376	(0.303)
Not in the LF	0.567	(0.753)	0.466	(0.768)	0.445	(0.752)
Marital Experience						
Years Since 1st Marriage	0.041	(0.025)	0.046	(0.025)*	0.064	(0.028)**
Spouse in HH	-0.010	(0.364)	0.140	(0.373)	0.101	(0.363)
Migration Experience						
Migrant in 1994	0.311	(0.483)	0.400	(0.492)	0.388	(0.480)
Months in Urban Location	0.002	(0.005)	0.002	(0.005)	0.003	(0.006)
Community Characteristics						
Village Infrastructural Development (1994)						
Primary School	0.060	(0.089)	0.066	(0.089)	0.066	(0.087)
Kilometers To Health Center	-0.016	(0.025)	-0.010	(0.028)	-0.011	(0.027)
Kilometers To Hospital	0.180	(0.234)	0.089	(0.243)	0.109	(0.241)
Village Socio-Economic Development (1984)						
% Women in Non-Agricultural						
Occupation	-0.024	(0.060)	-0.002	(0.064)	0.003	(0.063)
% Women with Compulsory Educ.	0.036	(0.033)	0.049	(0.049)	0.052	(0.049)
% Aged 13-18 in School	0.007	(0.015)	0.012	(0.016)	0.012	(0.016)
Village Socio-Economic Development (1994)						
% Women in Non-Agricultural						
Occupation	---	---	-0.014	(0.023)	-0.015	(0.023)
% Women with Compulsory Educ.	---	---	-0.020	(0.039)	-0.020	(0.039)
% Aged 13-18 in School	---	---	0.004	(0.012)	0.003	(0.012)
Contraceptive Environment (1984)						
% Using Temporary Method	-0.009	(0.015)	0.004	(0.015)	0.004	(0.015)
% Using No Method (reference)						
% Using Sterilization	0.033	(0.012)***	0.021	(0.013)	0.021	(0.013)
Contraceptive Environment (1994)						
% Using Temporary Method	---	---	-0.041	(0.017)**	-0.042	(0.017)**
% Using No Method (reference)						
% Using Sterilization	---	---	0.002	(0.020)	0.002	(0.020)
Interaction Terms						
Months Urban by 84 % Temporary						
Method	---	---	---	---	0.000	(0.001)
Time in Urban By 184% Sterilization	---	---	---	---	0.000	(0.000)
Constant	-4.963	(1.709)***	-2.510	(2.514)	-2.389	(2.632)

*Note:*   * p<0.1, ** p<0.05, *** p<0.001. Numbers in parenthesis are robust standard errors.
All models control for the following household variables: relative household wealth, education level of most educated household member, household size, whether the household had multiple generations of adults, and the number of household member temporary absent from the village

Figure 4.1: Simulated Predicted Probability of Using Temporary and Permanent Contraception in 2000, based on Village Contraceptive Use in 2000 and 1994.
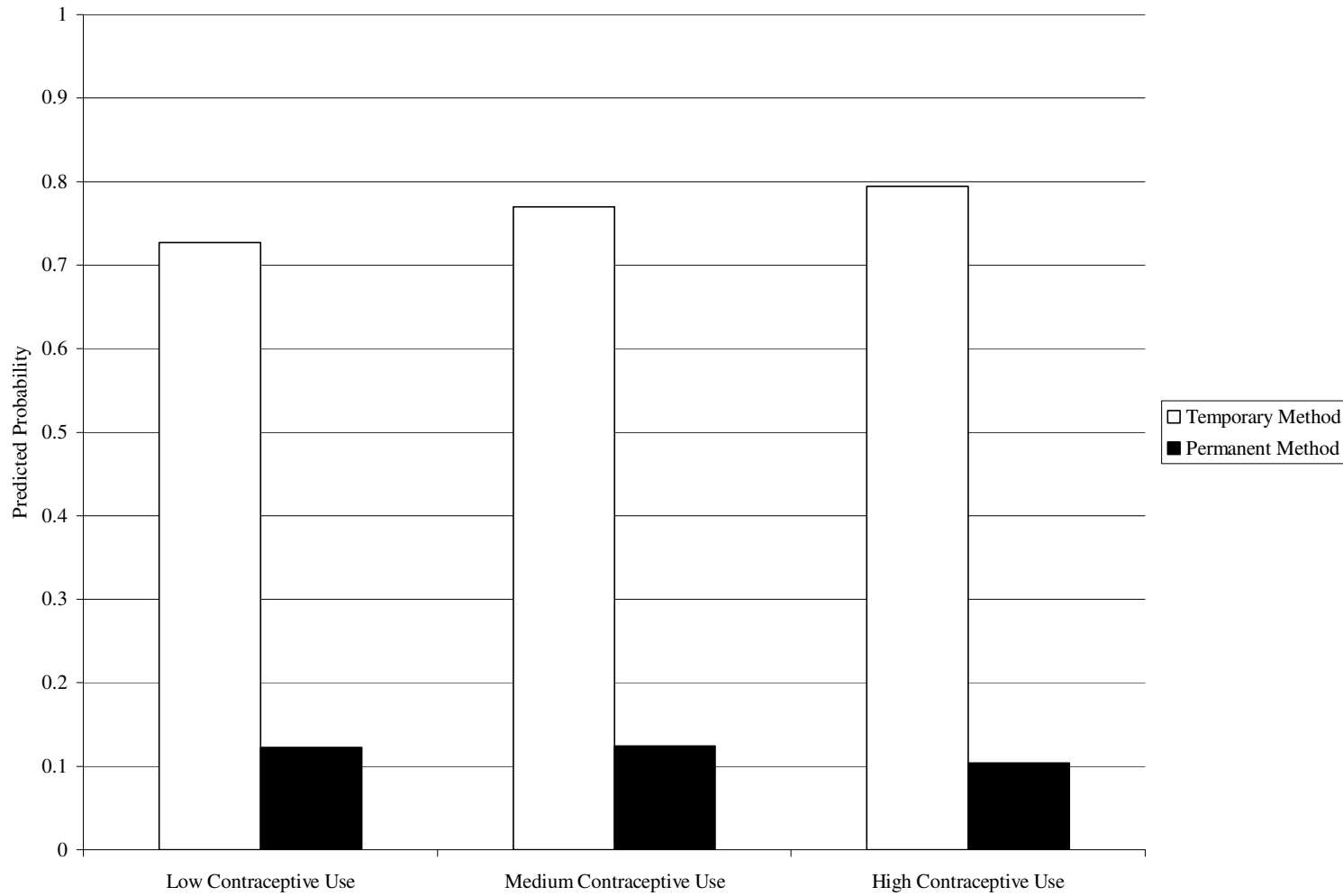
Figure 4.2: Simulated Predicted Probability of Using a Temporary Contraceptive method in 2000 at Differing levels of Urban Experience between 1984 and 2000.
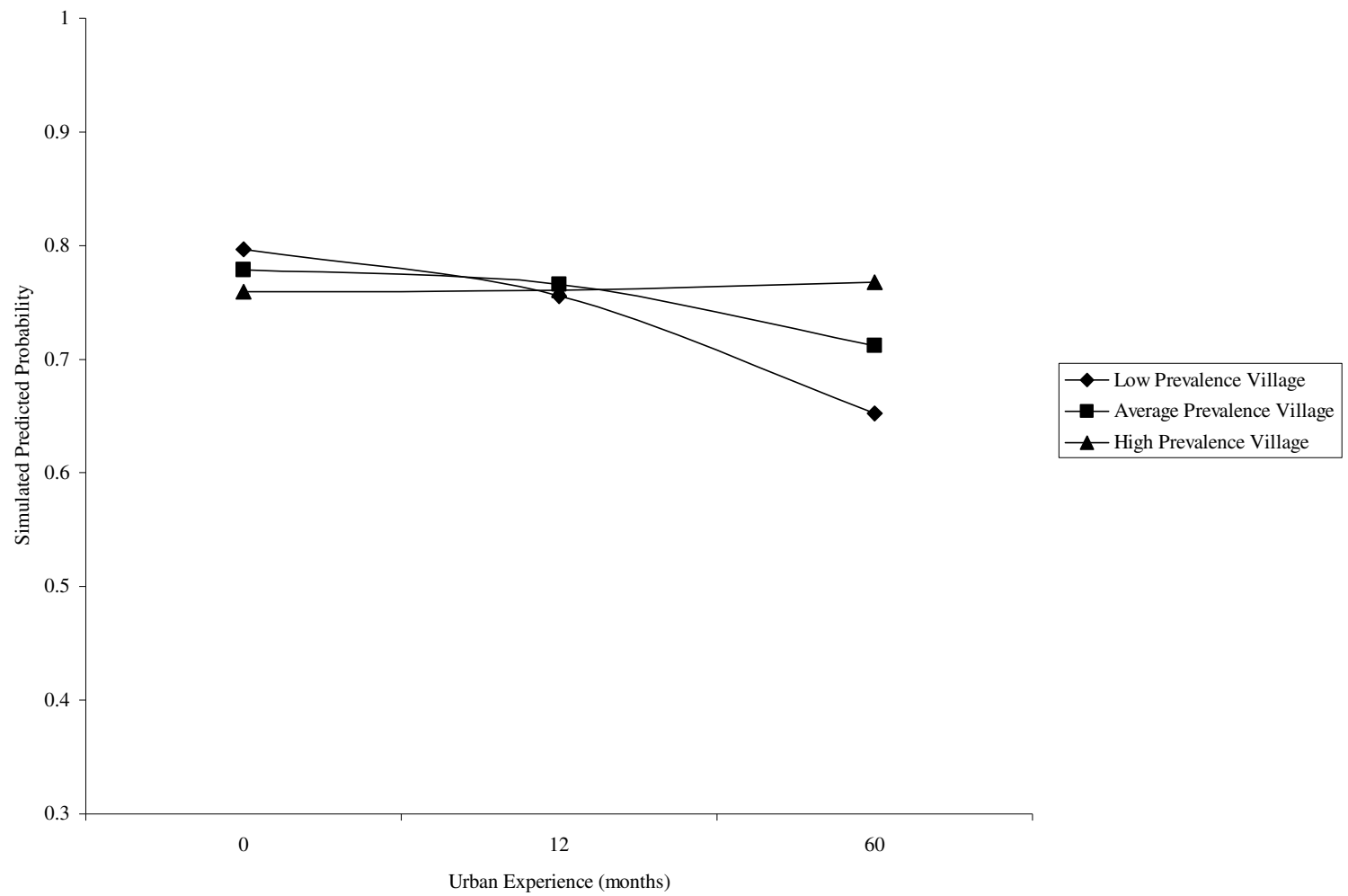
CHAPTER FIVE: CONCLUSIONS

In this dissertation, I explored how the processes of development and demographic change are related in Nang Rong, Thailand. While there are a number of aspects of the development process that have the potential to influence demographic behavior, the approach taken throughout the dissertation is based on a conceptualization of development as an inherently disruptive process where social and economic institutions are transformed within a short period of time. Faced with a changing environment, individuals, households, and communities adapt their behavior, demographic and otherwise, to attempt to take advantage of the new opportunities this presents, or at a minimum to maintain their social and economic standing. In exploring how this influences demographic behavior, I considered three questions: (1) To what extent is demographic behavior influenced by the strains resulting from development, which are broadly conceptualized as any threat to relative individual or household social and economic standing?; (2) How is fertility influenced by the types of migration that typify the contemporary development process, both in terms of current migration status and overall lifetime experience in urban areas?; and (3) To what extent does demographic behavior reflect the influence of community social context, focusing on the effect of past and present community contraceptive environment on women's contraceptive decisions in Nang Rong? Each of these questions address a different aspect of the way in which development influences demographic behavior in the context of

Nang Rong, and together they provide some insight into the ways in which social and economic changes inherent to the contemporary development process influence demographic behavior. I begin by briefly summarizing the findings of the analyses conducted in the previous three chapters, and then discuss the applicability of the modified multiphasic response framework developed in Chapter Two to these types of analyses. Finally, I conclude with a discussion of the directions for further research implied by the results of these analyses.

The analyses in Chapter Two address the first of the questions described above, focusing on the role of strain in shaping fertility and migration behavior in Nang Rong, based on a variation of the framework provided by the theory of multiphasic response originally developed by Davis (1963). This approach argues that the disruptive nature of the contemporary development process places strain on established social, economic, and demographic behaviors by disproportionately favoring those who modify their behavior to suit the needs of the modern economy. This strain acts as the stimulus for individuals and households to change their fertility and/or migration behavior. The results of the analyses in this chapter suggest that both fertility and migration behavior are responsive to the strains generated by the development process. Migration was more responsive to differences in strain levels than was fertility, probably reflecting the fact that in this context fertility levels were already low and therefore relatively inflexible. In addition, the results also suggest that each of these responses is somewhat sensitive to the degree to which other individuals in their communities have adopted the other response. These findings are consistent with the expectations of the multiphasic response theory as conceptualized in this analysis, suggesting that this approach has some merit as a

theoretical framework describing the relationship between development and population change. This is reinforced by the flexibility of this approach in terms of its ability to accommodate other theoretical explanations of the effect of development on fertility behavior. This suggests that this approach may potentially form the basis for a broader theoretical framework explaining this relationship.

In Chapter Three, I examined the effect of migration to urban areas on fertility behavior, focusing on both the differences between short- and long-term migration and how this is related to broader life course processes, particularly family formation. This question is relevant to this study because the contemporary process of development almost always is accompanied by sharp increases in population mobility, which in turn influences fertility behavior. The results of the analysis suggest that in this context the effect of migration on fertility cannot be fully understood unless its relationship with the family formation process is also taken into account. In addition, these results also suggest that the effect of lifetime exposure to urban environments differs from that of more recent migration experiences. In particular, the effects of migration depended largely on whether women had reached the culturally prescribed limit of two children. For those women with less than two children, being a current migrant two years prior to the time of interest encouraged fertility, although lifetime experience in urban areas had the expected negative effect on fertility. In contrast, neither of the measures of migration used in the analyses had an effect on fertility for those with two or more children. These results, which largely contradict the expectations of the assimilation, adaptation, and disruption hypotheses, reflect the ways in which the family formation process and migration are related in this context, with migration encouraging entry into marriage and

therefore encouraging fertility. This finding is consistent with earlier research in this area that found that migration encourages marriage (Jampaklay 2003), which in this context is closely associated temporally with entry into parenthood. These findings illustrate well the ways in which the changes in demographic behavior resulting from the development process are interrelated, making a complete assessment of one impossible without taking the other into account.

In Chapter Four, I focus on the influence of community and household context on women's contraceptive behavior, adopting an approach based on the life course framework that takes into account change at both the contextual and individual levels. To do this, I examined the role of both past and present context on use of temporary and permanent contraception while taking into account individual life course stage and lifetime experiences with urban environments since age 13. The results suggest that both past and present context influence contraceptive behavior, but that the characteristics of this relationship differ somewhat for each. While current context influences contraceptive behavior in a number of ways, including through community contraceptive environment, the effect of past context is primarily through setting the stage for current context. The results suggest that women from communities with higher current overall use of modern contraception were more likely themselves to be using temporary contraception, although this was not the case for permanent methods, which were less responsive to current context. The impact of past context was most clear when examining the effect of migration on contraceptive use for women from villages with different levels of past use, with the effect of migration differing substantially for women from communities with different histories of contraceptive use. As might be expected,

the analyses suggest that effect of past context is greater when it is significantly different from current context, with past context having more of an effect for the analysis of temporary methods, which included information from 1984 and 2000, than for the analysis of sterilization, which used information from 1994 and 2000, much more similar contraceptive environments. This implies that the empirical effects of past and present context on current behavior are likely to become more similar as the differences between Nang Rong and urban areas in Thailand in terms of demographic behavior decrease. In terms of the broader effect of development on behavior, the analyses in this chapter suggest that while the 'new' environment resulting from the development process has the most influence on behavior, the effect of this is still shaped in a number of ways by the 'old' context of the formative years.

While there are a number of interesting findings in these three studies, two broad themes emerged as being particularly important. The first is the effect of the social and economic changes associated with the development process on demographic behavior. This was a feature of each of the papers, although in quite different ways. Chapter Two explores this relationship directly, and finds that demographic behavior is responsive to differences in strain levels, suggesting that the modified multiphasic response framework has some promise as an explanatory framework linking development to behavioral changes at the individual level. The role of development in Chapter Three is less direct, with the analysis focusing on the effect of one of the more common characteristics of the contemporary development process, migration, on fertility. The results of this analysis suggest that in this context migration is sufficiently common that it has become part of the overall family formation process, a testament to the disruptive effect of development

on rural areas. Finally, Chapter Four examines the role of context in shaping contraceptive behavior, and finds evidence that rapid development and fertility change have to a substantial degree erased the differences in the effects of past and present contexts. Together, these results suggest that the economic and social changes associated with development have played an important role in shaping demographic behavior in Nang Rong over the past 20 years. However, the results also suggest that the effect of these changes on demographic behavior may be becoming less important as patterns of behavior become increasingly similar between urban and rural areas, suggesting that rural Thais may have to find other ways of responding to the demands of the new economy. To a significant extent this is already taking place, with rural Thais increasingly involved in non-agricultural occupations and investing in education for their children, both potential responses to strain.

The second theme common to each of these studies is the importance of migration experience in shaping behavior, both in terms of current residence status and over the lifetime. While the role of migration differed across each of the individual papers, its role as a proxy for exposure to contextual influences other than those of the home village was particularly important. This suggests that at least some of the effects attributed to the assimilation and adaptation arguments may be more correctly thought of in terms of arguments related to the role of context in shaping behavior. The effect of migration was particularly important when considered in tandem with life course stage. This was particularly the case in Chapter Three, where the effect of migration on fertility was dependent on life course and family formation stage. This implies a considerably more

complex relationship between life course stage and behavior than is generally used in analyses of this type.

The findings from these three studies provide a detailed picture of the ways in which demographic behavior in Nang Rong is shaped by the social and economic changes that are an integral part of the development process, and highlight the need for a comprehensive theoretical framework that is able to address the complexity of the relationship between development and population change. This framework must be sufficiently flexible as to allow for a range of different influences on this relationship, particularly those highlighted by the life course perspective, such as family formation stage. In Chapter Two I suggest a potential candidate, using a modified version of the multiphasic transition theory where the key mechanism is the strain generated by the changes associated with development place on existing social, economic, and demographic behaviors. While this strain may be conceptualized in a number of ways, this approach focuses on the potential loss of relative socioeconomic status resulting from the changes associated with the development process, which typically is both poorly distributed geographically and favors those who adjust quickly to the demands of the new market economy that typically drives the development process. One result of this is a widening gap in both social and economic status between those who have adapted their behavior to take advantage of these new opportunities and those who have not, placing increasing pressure on late adaptors to change their behavior. Within this context, demographic behavior may become an important vehicle for social mobility, with changes in behavior potentially leading to greater relative prosperity and less strain. This is true for both fertility and migration, both of which play an important role in shaping

the degree to which individuals are able to take advantage of the new opportunities afforded by the emergence of the market economy.

Using this approach as the theoretical foundation for understanding the relationship between development and demographic change has a number of advantages. Firstly, this approach is sufficiently flexible to be able to accommodate for the full complexity of this relationship, particularly in terms of responses, which may cover a wide range of both demographic and non-demographic behaviors. In addition, these responses are assumed to have an effect on each other, and therefore must be considered as a part of an overall process, rather than being considered individually. The results of the analyses in this dissertation support this approach in a number of ways. While Chapter Two is the only article to explicitly apply the multiphasic response framework to fertility and migration, the ways in which these behaviors are tied together are a key theme of Chapter Three, which also illustrates the ways in which both are linked over the life course. While the analysis in Chapter Four is not explicitly based on this framework, the results reinforce the finding that the changes brought on by the development process, in this case shifts in the social environment surrounding contraceptive use, play an important role in shaping demographic behavior. A further advantage of this approach is that it readily incorporates the insights of other less comprehensive theories linking macro-level change to shifts in demographic behavior at the individual level, in addition to other theoretical frameworks explaining behavior, such as life course theory. This allows for a more comprehensive and coherent understanding of the variety of ways in which the processes of development and demographic change are related, resolving both

the problems associated with the fragmentary nature of the current theories explaining this relationship and those associated with the traditional demographic transition theory.

While these analyses provide important insights into the relationship between the processes of development and population change, the results also raise a number of additional questions that merit further attention. These are in part a reflection of the limitations associated with both the study designs employed in this research and of the data itself. For example, this research was not able to examine how men's demographic behavior was influenced by the changes associated with the development process. This is problematic for a number of reasons, not least because decisions regarding fertility and migration typically involve at least some consultation between partners, and women's decisions regarding both of these activities are likely to be influenced by the characteristics of their partners. In addition, there are a number of reasons why the behavior or men is likely to differ from that of women, particularly with regard to the timing of important life course events. Ideally, future research would include information on men as well as women, providing a more comprehensive assessment of the overall effect of development on demographic behavior. An additional benefit of this approach would be that this would make possible empirical models exploring the degree to which migration and fertility decisions are made by household units, rather than by individuals in isolation, as implicitly assumed by the current modeling approach. Another potential avenue for future research relates to the effect of the economic crisis that struck Thailand in 1997, which has a number of implications for the analyses done as a part of this research, particularly when the increased levels of hardship and strain this implied for rural households is considered. While the effect of the crisis was acknowledged in each

of the three studies, the study designs employed and the theoretical orientation of the research meant that a detailed assessment of the ways in which this affected demographic behavior was not possible. Finally, the unusual characteristics of the setting of this study suggest that replicating this approach in a different setting could provide some further insight into the relationship between development and fertility. However, the unique nature of the data used in these analyses makes replication particularly challenging, particularly within the context of a developing country.

This research has highlighted a number of ways in which the development process influences demographic behavior, and suggests a framework for the further exploration of this issue based on the multiphasic response theory in conjunction with the insights of the life course framework. While the questions asked in this research are of considerable theoretical interest, particularly to demographers, they also have a number of practical implications, particularly in terms of both development and family planning programs. As our understanding of the linkages between these two processes improves, so does our ability to ameliorate some of the negative effects of development, many of which are expressed via shifts in demographic behavior. While there remain a great many questions with regard to this relationship, it is hoped that this dissertation goes some way towards improving our understanding of it, particularly in contexts of rapid social, economic, and demographic change.

APPENDIX: FULL TABLES FROM CHAPTER FOUR

These tables include all household variables as well as individual and community variables.

Table A4.1: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Contraceptive Decisions in 2000 – Non-Sterilized, Married Women Aged 31-40 in 2000: Results from a Logistic Regression (N=1019).

	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Individual Characteristics (2000)						
Age: 31-35 (reference)						
36-40	-0.469	(0.156)***	-0.474	(0.160)***	-0.467	(0.161)***
Education						
Completed Years	-0.048	(0.061)	-0.039	(0.061)	-0.039	(0.061)
Occupation						
Agricultural (reference)						
Non-agricultural	-0.523	(0.186)***	-0.488	(0.195)**	-0.483	(0.190)**
Not in the LF	-0.858	(0.382)**	-0.780	(0.388)*	-0.764	(0.377)**
Marital Experience						
Years Since 1st Marriage	0.023	(0.022)	0.018	(0.022)	0.018	(0.022)
Spouse in HH	1.623	(0.315)***	1.598	(0.325)***	1.671	(0.338)***
Migration Experience						
Months in Urban Location	-0.007	(0.003)**	-0.007	(0.003)**	-0.006	(0.003)*
Household Characteristics (2000)						
Household Wealth						
Poor (reference)						
Middle	0.128	(0.187)	0.086	(0.191)	0.104	(0.187)
Rich	-0.250	(0.259)	-0.272	(0.264)	-0.281	(0.264)
Education Level of Most Educated						
Member	0.049	(0.050)	0.046	(0.051)	0.045	(0.051)
Household Size	0.356	(0.102)***	0.347	(0.109)***	0.354	(0.107)***
Extended Household	-0.514	(0.207)**	-0.484	(0.211)**	-0.500	(0.210)**
Community Characteristics						
Village Infrastructural Development (2000)						
Primary School	0.003	(0.127)	0.040	(0.123)	0.011	(0.118)
Kilometers To Health Center	-0.172	(0.045)***	-0.114	(0.040)***	-0.111	(0.039)***
Kilometers To Hospital	0.004	(0.015)	0.005	(0.015)	0.010	(0.014)
Village Socio-Economic Development (1984)						
% Women in Non-						
Agricultural Occupation	-0.014	(0.046)	0.009	(0.042)	0.000	(0.040)
% Women with						
Compulsory Education	-0.017	(0.018)	0.005	(0.036)	-0.004	(0.035)
% Aged 13-18 in School	0.004	(0.007)	-0.012	(0.010)	-0.011	(0.010)
Village Socio-Economic Development (2000)						
% Women in Non-						
Agricultural Occupation	---	---	0.008	(0.014)	0.011	(0.013)
% Women with						
Compulsory Education	---	---	-0.024	(0.031)	-0.019	(0.029)
% Aged 13-18 in School	---	---	0.014	(0.007)**	0.014	(0.007)**

Table A4.1: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Contraceptive Decisions in 2000 – Non-Sterilized, Married Women Aged 31-40 in 2000: Results from a Logistic Regression (N=1019) –(Continued).

	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Contraceptive Environment (1984)						
% Using Temporary Method	-0.003	(0.008)	-0.005	(0.009)	-0.006	(0.008)
% Using No Method (reference)						
% Using Sterilization	-0.013	(0.006)**	-0.008	(0.009)	-0.009	(0.009)
Contraceptive Environment (2000)						
% Using Temporary Method	---	---	0.047	(0.016)***	0.049	(0.015)***
% Using No Method (reference)						
% Using Sterilization	---	---	0.026	(0.020)	0.030	(0.020)
Interaction Terms						
Time in Urban By % Temporary Method (1984)	---	---	---	---	0.001	(0.000)**
Time in Urban By % Sterilization (1984)	---	---	---	---	0.001	(0.000)**
Constant	0.466	(0.780)	-2.535	(2.328)	-3.459	(2.207)

Note: * $p<0.1$, ** $p<0.05$, *** $p<0.001$.
Numbers in parenthesis are robust standard errors.

Table A4.2: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Sterilization between 1994 and 2000 – Women Aged 31-41 in 2000: Results for a Logistic Regression (N=958).

	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Individual Characteristics (1994)						
Age: 31-35 (reference)						
36-40	-0.031	(0.197)	-0.058	(0.199)	-0.116	(0.201)
Education						
Completed Years	-0.036	(0.053)	-0.042	(0.057)	-0.038	(0.058)
Occupation						
Agricultural (reference)						
Non-agricultural	0.340	(0.317)	0.372	(0.305)	0.376	(0.303)
Not in the LF	0.567	(0.753)	0.466	(0.768)	0.445	(0.752)
Marital Experience						
Years Since 1st Marriage	0.041	(0.025)	0.046	(0.025)*	0.064	(0.028)**
Spouse in HH	-0.010	(0.364)	0.140	(0.373)	0.101	(0.363)
Migration Experience						
Migrant in 1994	0.311	(0.483)	0.400	(0.492)	0.388	(0.480)
Months in Urban Location	0.002	(0.005)	0.002	(0.005)	0.003	(0.006)
Household Characteristics (1994)						
Household Wealth						
Poor (reference)						
Middle	-0.448	(0.226)*	-0.433	(0.227)*	-0.451	(0.232)*
Rich	-0.149	(0.254)	-0.127	(0.257)	-0.121	(0.258)
Education Level of Most Educated Member	0.074	(0.032)**	0.072	(0.032)**	0.075	(0.033)**
Household Size	0.013	(0.078)	0.016	(0.080)	0.020	(0.081)
Extended Household	0.602	(0.319)*	0.621	(0.316)*	0.613	(0.322)*
# Current Migrants in Household	-0.006	(0.212)	0.028	(0.208)	0.023	(0.206)
Community Characteristics						
Village Infrastructural Development (1994)						
Primary School	0.060	(0.089)	0.066	(0.089)	0.066	(0.087)
Kilometers To Health Center	-0.016	(0.025)	-0.010	(0.028)	-0.011	(0.027)
Kilometers To Hospital	0.180	(0.234)	0.089	(0.243)	0.109	(0.241)
Village Socio-Economic Development (1984)						
% Women in Non-Agricultural Occupation	-0.024	(0.060)	-0.002	(0.064)	0.003	(0.063)
% Women with Compulsory Education	0.036	(0.033)	0.049	(0.049)	0.052	(0.049)
% Aged 13-18 in School	0.007	(0.015)	0.012	(0.016)	0.012	(0.016)
Vllage Socio -Economic Development (1994)						
% Women in Non-Agricultural Occupation	---	---	-0.014	(0.023)	-0.015	(0.023)
% Women with Compulsory Education	---	---	-0.020	(0.039)	-0.020	(0.039)
% Aged 13-18 in School			0.004	(0.012)	0.003	(0.012)
Contraceptive Environment (1984)						
% Using Temporary Method	-0.009	(0.015)	0.004	(0.015)	0.004	(0.015)
% Using No Method (reference)						
% Using Sterilization	0.033	(0.012)***	0.021	(0.013)	0.021	(0.013)

Table A4.2: The Effects of Individual, Household, and Community Characteristics, both Past and Present, on Sterilization between 1994 and 2000 – Women Aged 31-41 in 2000: Results for a Logistic Regression (N=958) – (Continued).

	Model 1		Model 2		Model 3	
	β	S.E.	β	S.E.	β	S.E.
Contraceptive Environment (1994)						
% Using Temporary Method	---	---	-0.041	(0.017)**	-0.042	(0.017)**
% Using No Method (reference)						
% Using Sterilization	---	---	0.002	(0.020)	0.002	(0.020)
Interaction Terms						
Time in Urban By % Temporary Method (1984)	---	---	---	---	0.000	(0.001)
Time in Urban By % Sterilization (1984)	---	---	---	---	0.000	(0.000)
Constant	-4.963	(1.709)***	-2.510	(2.514)	-2.389	(2.632)

Note: * p<0.1, ** p<0.05, *** p<0.001.

         Numbers in parenthesis are robust standard errors.

Table A4.3: The Effects of 1984 Individual, Household, and Community Characteristics on Inclusion in Final Analysis Dataset in 2000: Results for a Logistic Regression (N=3547).

	β	S.E.
Individual Characteristics		
Age: 15-19	-0.327	(0.074)***
20-24 (reference)		
Education		
Completed Years	-0.029	(0.020)
Occupation		
Agricultural (reference)		
Non-agricultural	-0.862	(0.127)***
Not in the LF	-0.635	(0.153)***
Marital Experience		
Not Married (reference)		
Currently Married	0.090	(0.087)
Previously Married	-1.425	(0.498)***
Household Characteristics		
Household Wealth		
Poor (reference)		
Middle	0.357	(0.084)***
Rich	0.615	(0.113)***
Education Level of Most Educated Member	-0.021	(0.016)
Household Size	-0.097	(0.017)***
Extended Household	0.166	(0.118)
Community Characteristics		
Village Infrastructural Development (2000)		
Primary School	0.015	(0.083)
Kilometers To Health Center	-0.025	(0.020)
Kilometers To Hospital	0.007	(0.007)
Village Socio-Economic Development		
% Women in Non-Agricultural Occupation	-0.075	(0.022)***
% Women with Compulsory Education	-0.008	(0.012)
% Aged 13-18 in School	0.000	(0.006)
Village Contraceptive Environment		
% Using Temporary Method	-0.001	(0.005)
% Using No Method (reference)		
% Using Sterilization	0.003	(0.004)
Constant	1.363	(0.656)**

Note: * p<0.1, ** p<0.05, *** p<0.001.
Numbers in parenthesis are robust standard errors.

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