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Chapter 4
Structural Transformation and the Release of Labor from Agriculture

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4.1. Introduction

Structural transformation refers to changes in the structure of an economy as it develops from a low- to a high-income level. The economic structure is measured mainly by the sectoral composition of its gross domestic product (GDP) and employment. At the early stage of development, both the GDP and employment compositions of an economy are dominated by the agriculture sector. As the economy develops, both the GDP and employment compositions shift away from agriculture to industry and then to services.

In many developing countries in Asia, the shifting of economic activities from agriculture to industry and services has had five general characteristics. First, the agriculture share declines faster in terms of output than employment. Second, growth of agricultural productivity is significantly higher than in developing countries in other regions. Third, this also applies to land productivity. Fourth, since the early 1960s, the production of traditional crops has increased significantly, resulting from technological change. Fifth, agriculture has shifted to higher-value products (Briones and Felipe 2013).

Indonesia is no stranger to these general characteristics. In relation to the first one, this chapter aims to investigate the lagging employment transformation, despite the rapid sectoral shift in output terms. While there are many studies on how Indonesia's economy has shifted from agriculture to services, limited discussions are available on employment share transformation. Despite the fact of increasing formal sector employment, Manning and Purnagunawan (2016) show that Indonesia did not experience a sustainable decline in agricultural employment followed by improved productivity in agriculture. They also find that labor wages in agriculture are at the bottom of

the distribution, and that jobs in the informal sector have not declined sharply. Those three indicators imply that Lewis' turning point hypothesis (Lewis 1954) might not be observable in the Indonesian case. In fact, this finding motivates further research to better understand the process of labor market change. The issue of employment transition also has a special place in discourse about development, as it is an integral part of the role of structural transformation in poverty reduction (Vollrath 2009, Teal 2011).

This chapter's contribution is the first effort to reveal the pattern of employment transformation using a long-term longitudinal survey, the Indonesia Family Life Survey (IFLS).[1] Utilizing this dataset, we have generated matrixes of employment transformation for a 17-year period. The chapter also looks at both micro-level variables (e.g., individual or household characteristics) and macro-level variables (government policies, labor market indicators, etc.) that may influence people who move out to other employment sectors as well as those who stay in their original sectors.

The rest of the chapter is structured as follows. Section 2 discusses Indonesian structural transformation and its theoretical framework. Section 3 describes the data and methods used in the analysis. Section 4 discusses the pattern of structural transformation in employment that has taken place in Indonesia. Section 5 concludes and offers some policy recommendations based on the insights that emerge from the results.

4.2. Structural Transformation

4.2.1. Structural Transformation in Indonesia

Over the long run, significant structural transformation is evident in the Indonesian economy. In 1980, the contribution of the agriculture sector to GDP was 24%, while its contribution to employment was 56.4%. By 2014, the contribution of agriculture to GDP had diminished to 13.3% and to employment, it was 34.3%. During the same period, industry's contribution to GDP was relatively stable at 41.7% in 1980 and 41.9% in 2014, while industry contribution to employment had increased from 13.1% to 21.0%. Meanwhile, the contribution of the services sector to GDP had increased significantly, from 34.3% to 42.3%, and to employment, from 30.4% to 44.8%.

Compared with "Asian miracle" economies such as Japan; the Republic of Korea; and Taipei,China, the pace of employment transition in Indonesia has been rather slow in the

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[1]   Rand Corporation (various years).

last 2 decades.[2] The annual decline of agriculture's employment share ranged between 2 ½% and 6% in the Republic of Korea and Taipei,China (Manning and Purnagunawan 2016). Even compared with other Southeast Asian countries such as Viet Nam, Malaysia, and Thailand, Indonesia still fell behind in terms of the decline in the share of agricultural employment.

If we further stretch the time horizon and focus more on agriculture, as indicated in Table 4.1, unbalanced structural transformation figures for Indonesia are even more evident. From 1967 to 2014, the share of agriculture in GDP had fallen by 38.1 percentage points or proportionally about 74% of its share in 1967. Meanwhile, during the same period, the employment share fell proportionally by only 50%. Consequently, the agriculture sector's GDP to employment ratio experienced a greater decline than in the nonagriculture sector.

Table 4.1: Structural Transformation in Indonesia (%)

Sector	Indicator	1967	2014	Percentage Point Change	Change from 1967 Level
Agriculture	Share of GDP	51.4	13.3	-38.1	-74
	Share of employment	69.0	34.3	-34.7	-50
	GDP/employment ratio	0.75	0.39	-0.36	-47
Nonagriculture	Share of GDP	48.6	86.7	38.1	78
	Share of employment	31.0	65.7	34.7	119
	GDP/employment ratio	1.57	1.32	-0.25	-15.8

Sources: For GDP data, World Bank. World Bank Open Data. data.worldbank.org (accessed 26 June 2016); for employment data, Sandri et al. (2007) and BPS (various years) Statistical Yearbook of Indonesia 2014.

Beyond the concerning figure of a sharp decline in agriculture's GDP to employment ratio, the issue of poverty is even more worrying. Since poverty was first officially recorded in 1976, Indonesia undoubtedly succeeded in cutting the poverty level. Table 4.2 suggests that rural poverty indeed has declined quite rapidly. However, the gap between rural and urban poverty rates has grown wider. This cannot be separated from the fact that a large share of poor people in rural areas work mostly in agriculture.

Table 4.2: Poverty Rate in Indonesia, 1976–2013 (%)

	1976	1996	2013
National	40.1	24.20	11.47
Rural	40.4	25.72	14.42
Urban	38.8	21.92	8.52
Share of Poor People in Rural Areas (%)	82	72	63
Share of Poor People in Agriculture (%)	~70	68.5	60

Sources: BPS. Number of Poor People. Percentage of Poor People and the Poverty Line, 1970–2017 (accessed 26 June 2016); and Suryahadi et al. (2009).

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[2]   See Briones and Felipe (2013), Manning and Purnagunawan (2016), and Athukorala and Wei (2015).

The share of poor people in rural areas has significantly declined, but the share of poor people in agriculture has not changed as much. Combining these two facts, it is quite likely that one of the reasons for the widening gap between urban and rural poverty rates is the declining GDP to employment ratio of the agriculture sector.

Previous studies on poverty reduction in Indonesia suggest the importance of employment transformation on poverty reduction. Suryahadi et al. (2012) found that growth of the services sector had the greatest impact on reducing poverty in both rural and urban areas. However, as mentioned earlier, the transformation must also be led by improving agricultural productivity in the first place, since agricultural growth remains a significant contributor to poverty reduction in rural areas (Suryahadi and Hadiwidjaja 2011). Improving productivity in agriculture while maintaining rural services growth to support the agriculture sector can be seen as two sides of the same coin. By following the same households over a long period, the present study expected to uncover the dynamics of employment and livelihood in Indonesian households.

Labor policy in Indonesia is codified in Labor Law No. 13/2003, which has institutionalized minimum wages, hiring and firing mechanisms, contract work, severance pay, and outsourcing. These labor market institutions have an impact on employers' discretion over the size and composition of the workforce, reducing labor market flexibility (Manning 2004). As the labor market becomes more rigid, labor-intensive investments are hampered and employers tend to adopt more capital- and skill-intensive technologies, leading to a decrease in demand for unskilled workers, who constitute the majority of the poor. Thus, labor policies in Indonesia may have had adverse effects on employment transformation.

4.2.2. Theoretical Review

Lewis's (1954) seminal work on the unlimited labor supply hypothesis, followed by a series of important publications in the field (Ranis and Fei 1961, Lewis 1972), is the starting point for the theoretical framework adopted in this chapter. The main idea of the hypothesis can be summarized as follows: A developing country starts with the traditional economy, i.e., rural farm activities with an abundant low-skilled labor supply. At this stage, economic growth relies on the presence of cheap labor. As the economy grows, real wages in the traditional sector rise to find a new equilibrium as labor supply flows from the traditional to modern sectors such as industries and services. It is then expected that a "turning point" will be realized, where the economy shifts to more capital- and skill-intensive activities.

How this dual labor market theory works is illustrated in Figure 4.1, adapted from Manning (1995) and Suryahadi (1998). Let the horizontal axis U ranging to U' in both parts of the figure represent the stock of unskilled labor in the economy, and the vertical axis *W* is the real wage. The supply of unskilled labor in the modern sector is represented by the curve $W_R S_M$, which has a flat segment along $W_R A$, representing the reservation wage level W_R. In the traditional sector, the demand for unskilled labor is represented by the curve $D_T D_T$, which has a flat segment from the left up to point A, representing the subsistence wage level W_S. The level of wages in the modern sector, W_R, is higher than the subsistence level of wages in the traditional sector, W_S, as a premium to induce workers to migrate from the traditional to the modern sector.[3]

Let demand for unskilled labor in the modern sector be D_M^1, which determines the number of unskilled workers employed with level of wages W_R. Meanwhile, the number of the unskilled who are in the traditional sector is $N_1 U'$, and they receive wages W_S. A shift in the demand curve to D_M^2 will incentivize workers to move to the modern sector.[4] This would yield a decrease in the supply of unskilled labor in the traditional sector, measured by the shifting of $S_T^1 W_S$ to $S_T^2 W_S$. It would immediately increase the number of unskilled workers in the modern sector by $U N_2$ while reducing the number who stay in the traditional sector by $N_2 U'$. The important part of the dynamics at this stage is that the respective wages received are unchanged.

Figure 4.1: Dual Labor Market

Sources: Manning (1995) and Suryahadi (1998).
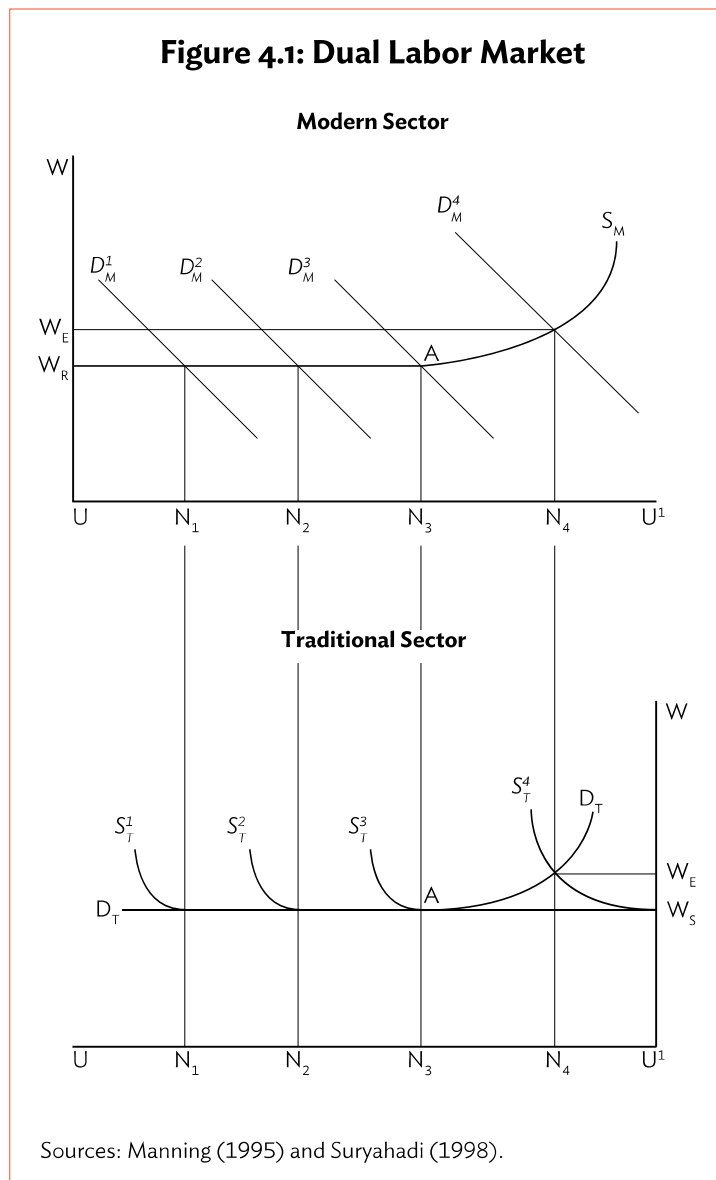
[3] The wage levels cannot be lower than W_R in the modern sector and W_S in the traditional sector, because there are minimum wage levels below which workers will not accept employment.

[4] Lewis (1954) assumed that the modern sector expansion is a result of reinvested profits.

If the modern sector expands continuously, obviously the demand for unskilled labor D_M^3 will increase. This will cause a temporary rise in real wages for those in the modern sector. But it will be followed by a flow of workers from the traditional to the modern sector. In the end, the market will clear and real wages will remain unchanged. As the demand for unskilled labor in the modern sector shifts to D_M^4, real wages will finally increase. This will be achieved as a significant proportion of unskilled labor, UN_4, work in the modern sector, leaving only N_4U' in the traditional sector. Under perfect labor mobility, the market will clear, and both modern and traditional workers will receive W_E. The previous equilibrium at point A is then referred to as the turning point.

The theory itself has been the subject of challenges from both the empirical and theoretical framework perspectives. Several critiques have arisen, including the following: (1) What the so-called "modern economy" is based on may be unskilled labor-saving technological change; in which case, wages and employment of unskilled labor are unlikely to change (Todaro 1989). (2) Human capital accumulation differs across sectors (Buera and Kaboski 2009). (3) In traditional societies, "hiring and firing" mechanisms, or wage-bargaining mechanisms to achieve neoclassical equilibrium, seem unrealistic, because they are subject to family and communal arrangements (Hayami and Kikuchi 1982, Ranis 2012). The basic model has limited power to explain some empirical puzzles. One of them is the lagging employment transformation puzzle, wherein many developing countries experience significant transformation in terms of output but stagnation in terms of employment share (Lavopa 2015). Based on the aforementioned critiques, it emerges that individual, household, and community characteristics have the potential to explain the employment transformation puzzle.

4.2.3. Determinants of Employment Transformation

This chapter focuses on pull and push factors in the release of workers from rural farm activities. From developed country experience, as a comparison, Dennis and Iscan (2007) showed that increasing productivity growth in agriculture explains out-migration from agriculture in the United States. One important factor in increasing productivity growth in agriculture is mechanization (Yang and Zhu 2013). Moreover, some authors such as Johnson (2000) also believe that increasing agricultural productivity will increase rural nonfarm activities and livelihood diversification. Beside productivity, wage differences between sectors and competitiveness of farmers are two important aspects of labor transition (Manning and Purnagunawan 2016, Foster and Rosenzweig 2007). A lesser, yet important, aspect that has been discussed in some empirical works on labor transformation is individual-level characteristics that might affect structural transformation, such as human capital (Foster and Rosenzweig

1995). These individual characteristics can also be seen as part of the social mobility cost that hinders the labor transformation process, in addition to macro-level aspects (World Bank 2016).

4.3.   Data and Methodology

4.3.1.   Identification Strategy

This chapter consists of two main analyses. First, we start by providing the story of longer-term employment transformation in Indonesia. We build employment transition matrixes disaggregated by several individual and household characteristics to identify who was able to move out and who stayed. The second main analysis is a more contemporary investigation (2007–2014) to gain more policy insights.

To identify the determinants of employment transformation of workers who started in the rural agriculture sector, we employ a multinomial logit model.[5] The dependent variables are a set of categories of those who moved to rural nonfarm activities, urban farm activities, and urban nonfarm activities by 2014. The probability is relative to those who stayed in rural farm activities. The independent variables are the initial individual characteristics and aggregate variables at the district and province levels that may affect individual worker's decisions to move out of the rural agriculture sector.

The model is formulated as follows:

$$\eta_{i,j,p} = \log \frac{\theta_{i,j,p}}{\theta_{i,J,p}} = \alpha_j + \mathbf{x}' \, \beta_{i,j,p} + z' \, \delta_p + \varepsilon_{ij}$$

where there are J categories of outcome η for each individual i, living in an area (province) p and a vector of potential determinant $\mathbf{x}$ that may affect the possibilities of individual i to be at outcome η. The outcome variables are the status of someone who started working in rural agriculture with a possible four ($J=4$) outcomes at the end period: stay in rural agriculture, move out to rural nonfarm activities (to industry and services), move out to urban farm activities, and move out to urban nonfarm activities. Hence, the probabilities are defined as

$$\theta_{i,j,p} = \frac{e\eta_{i,j}}{\sum_{k=1}^{J} e^{\eta_{i,k}}}$$

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[5]   For a detailed discussion of the multinomial logit model, refer to Wooldridge (2015).

We include more "intermediary" variables beside individual and household characteristics at the province level, such as labor market environment, and labor-related policies in agriculture, denoted as vector z, which might change over time.

4.3.2. Data Description

We use a series of the IFLS dataset as the main source of data. The IFLS is a longitudinal household survey that represents 83% of the total population of Indonesia. First conducted in 1993, the latest survey in 2014, known as IFLS5, provides observations over 21 years at the household, individual, and community levels. The IFLS sample frame follows the National Socioeconomic Survey (Survei Sosial Ekonomi Nasional—SUSENAS) 1993 sample frame. The IFLS collected detailed household information, not only on consumption but also on labor market activities. Another advantage of using the IFLS is that it also collects health care information and data on community facilities that are both absent from other national data sets such as the SUSENAS and the National Labor Force Survey (Survei Angkatan Kerja Nasional—SAKERNAS)—both available from Badan Pusat Statistik (BPS—Statistics Indonesia).

We use IFLS2, the 1997 survey, as the baseline for our study. The two first IFLSs (IFLS1 and IFLS2) did not include a direct question on main occupation in the labor module; instead they asked about the type of activities and what was produced. However, sector of employment is available for 1997 from IFLS3, which was conducted in 2000. Unfortunately, it is not possible to extract the 1993 information from IFLS3. We will later argue that the structure of the labor market in 1997 that we gleaned from IFLS3 is comparable to other labor market data in the same year from the BPS.

Using the IFLS, which has a more general purpose, to analyze the labor market may raise concerns about how well it will fit in with the sampling frames of other household surveys, especially SAKERNAS, which is designed specifically for the analysis of labor issues. Consistency between the IFLS and SAKERNAS has been discussed thoroughly by Dong (2016), who believes that, although there are differences in distribution by age and education as well as in wages, the IFLS remains consistent with SAKERNAS in the context of the sectoral proportion of workers, which is the most important feature for the analysis in this chapter. Potential problems may arise due to significant differences in the age and education distributions, if we try to estimate the Mincer equation to get returns to education, for example, in which SAKERNAS and the IFLS will provide different results, as Dong (2016) discussed. However, the issue is beyond the scope of this chapter, which focuses on employment choice. From Table 4.3, we can observe that, indeed, simply comparing labor market structure between the SAKERNAS and IFLS samples in each corresponding year shows a high level of consistency in 1997

but divergence over time. This is expected, given the nature of IFLS data collection as a panel survey, which is based on the 1993 sample and then tracks each original household and its descendants through the following survey rounds, without adding people outside the original sample.

Table 4.3: Sectoral Composition of Employment Based on SAKERNAS and IFLS Data

National Labor Force Survey (SAKERNAS)					
Sector	**1993**	**1997**	**2000**	**2007**	**2014**
Agriculture	0.50	0.41	0.45	0.44	0.35
Industry	0.16	0.19	0.17	0.18	0.21
Trade and Services	0.34	0.40	0.37	0.38	0.45
Indonesia Family Life Survey (IFLS) cross section[a]					
Sector	**1993**	**1997**	**2000**	**2007**	**2014**
Agriculture	…	0.42	0.36	0.35	0.26
Industry	…	0.18	0.19	0.19	0.27
Trade and Services	…	0.40	0.45	0.46	0.47

.. = data not available.
[a] Weighted using cross-section weight with attrition.
Source: Authors calculations based on data from Rand Corporation (various years) Indonesia Family Life Survey; and BPS (various issues) SAKERNAS.

Because we can observe that the employment structure in 1997 is almost identical between the National Labor Force Survey (Survei Angkatan Kerja Nasional— SAKERNAS) and IFLS, analyzing the 1997 cohort provides quite comparable and valid results. In addition, the IFLS and SAKERNAS also share the same definitions of work (Dong 2016). This gives external validity for the results that emerge from this study.

Finally, for the labor transition matrixes, we were able to build a panel data of 8,474 individuals who were covered in both the 1997 and 2014 surveys. We limited our observation to 5,548 individuals who completed the labor questionnaire in both years. For the more contemporary analysis of determinants (2007–2014), we found 16,293 individuals aged 15 and above in 2007 who were still present in the 2014 dataset. For the analysis of determinants, we took a subsample of 3,055 individuals who worked in rural agriculture in 2007. In the regression, we dropped 2 individuals due to missing individual information, which yielded a final sample of 3,053. In addition to individual characteristics from the IFLS, we also collected data on external "intermediary" variables, such as changes in plantation land area, an agricultural mechanization proxy; the farmer terms of trade; and changes in the wage gap in the labor market. The variable definitions are discussed in the following subsection.

4.3.3.   Variable Definitions and Hypothesis

This chapter examines the dynamics of employment transformation over the longer term for those who are in the labor force, according to the BPS definition. We investigate the factors that drive workers to move out of rural agriculture in subsequent periods. In the analysis, employment is classified into three major sectors—agriculture, industry, and services—and broken down into rural or urban location, thus resulting in six sectors.

We also examine other individual characteristics such as age, gender, working status, educational attainment, and poverty status in 1997. This basic information on individual characteristics is used to shed some light on what the key factors are that drive workers to move from the traditional to more modern sectors. We also analyze information on the second sector of work in nonfarm activities, which is defined as the sector of work on which the workers spend most of their time beside the main occupation. For convenience we sometimes refer to the rural or urban sector of work as the individual's job or occupation.

For the second part of the analysis, which looks at a more contemporary time frame (2007–2014), we collected several additional variables that might affect the decision to move out of rural agriculture, in addition to some common individual characteristics such as age, gender, education, and marital status. The first set of variables contains information on initial household-level (in 2007) characteristics such as landownership, defined as whether the individual worker lived in a household that owned a farm or land. We would expect that having their own land would hold people in agriculture (Galor et al. 2009). We also use a variable that indicates whether an individual was receiving an unconditional cash transfer. This variable is rather ambiguous, because on the one hand it may indicate a low-income family, but on the other hand it might provide additional cash to move out to another sector. Next, we employed a variable that indicates whether an individual came from a farming household with horticulture as the main activity. This variable is hypothesized to have a negative effect on the move out of agriculture. Horticulture is more remunerative and encourages more modern technology compared with food crops. These variables are available in the IFLS datasets.

The second set of explanatory variables includes time-invariant variables from the provincial and district levels that explain the dynamics of the market environment and labor policies related to agriculture in 2007–2014. We used the average income difference between services and agriculture in 2007–2014 from SAKERNAS at the district level. This variable seeks to capture the incentive to move out of farm activities.

We also used the ratio of number of two-wheeled tractors to number of agricultural households at the province level (for every 1,000 households). The number of two-wheeled tractors is based on government assistance for tractor purchases from 2007 to 2014, from data obtained from the Ministry of Agriculture. The data cover all subsidized tractors distributed and do not reflect the real stock of tractors owned by farmers. Using this variable, we were able to estimate the marginal effect of government in-kind assistance on employment transition.

From the same ministry, we also collected data on accumulated expansion of plantations by province. Expansion of plantations as part of rural farm activities can hold people in the agriculture sector. The last variable we employed is the average change in the farmer terms of trade (*nilai tukar petani*—NTP) from 2007 to 2014 collected from the BPS (2007-2014).[6] The NTP is an index that reflects the ratio between prices received and paid by farmers, normalized to 100 if the price received equals the price paid. An NTP greater than 100 indicates that farmers gain a surplus between consumption and production of an agricultural product. We expect to see positive changes in the NTP corresponding to stronger incentives to stay in agriculture.

4.4. Pattern and Determinants of Structural Transformation in Employment

4.4.1. Long-Term Patterns of Structural Transformation in the Main Sector of Employment

During the last 2 decades, there were significant shifts in workers' jobs between the rural and urban sectors. Table 4.4 presents the employment transformation matrix from 1997 to 2014, in which the economy is divided into six sectors, with rural and urban areas subdivided into agriculture, industry, and services sectors. The diagonal cells indicate "the stayers"—people who did not change their sector of employment during the period. In addition, the table also shows unemployment, housekeeping, and status outside the labor market.

The table indicates that most people who started working in rural agriculture stayed in the sector during the 17-year period or moved to housekeeping and out of the labor market. Among those who were able to move to another sector, most remained engaged in rural activities. In contrast, about one-third of people who worked in rural industry and rural services were able to move out to urban activities, mainly to the services sector.

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[6]   BPS (various years). Statistical Yearbook of Indonesia.

These findings show that there are limited options for people who work in rural agriculture to move out to urban sectors. One possible explanation of this phenomenon is the lower productivity and smaller initial capital of people who work in rural agriculture compared with those who work in other sectors in rural areas. The absence of capital seems to have entrapped them in low-productivity activities "semi" permanently. In fact, people who work in rural agriculture are also less likely to shift to rural services compared with those who work in rural industry. Again, this depicts very well how people who started in rural agriculture have limited opportunities even within rural areas.

Unsurprisingly, most of the people who started working in urban economies stayed in urban areas during the 17-year period. As can be seen in Table 4.4, almost half of the people who started working in urban services stayed in the same sector. Furthermore, the majority of those who started in agriculture and industry chose to move to services. This indicates that the urban services sector plays a role as the ultimate sector of employment for most people in urban areas.

Another interesting finding is that the transition from labor market to nonlabor market activities, particularly housekeeping, is quite significant. This is possibly due to stages in the life cycle, aging, and women's changes in marital status, and will be investigated further in the following section by looking at the gender composition of workers.

Table 4.4: Matrix of Employment Transformation, 1997–2014

Main Job in 1997	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture	35.06	16.09	13.86	6.27	2.91	4.71	0.04	9.50	11.49	100	2,821
Rural Industry	15.23	17.38	17.97	6.84	10.35	17.97	0.59	8.20	5.47	100	512
Rural Services	17.41	10.95	26.12	5.78	5.60	17.07	0.17	8.45	8.45	100	1,160
Urban Agriculture	3.33	2.00	2.50	24.13	11.65	30.45	0.17	11.48	14.31	100	601
Urban Industry	0.68	1.23	1.77	6.96	25.10	43.79	0.27	13.23	6.96	100	733
Urban Services	0.78	0.54	2.05	8.43	16.02	45.84	0.18	13.67	12.47	100	1,660
Unemployed	8.19	7.60	8.77	9.94	15.79	33.33	1.17	12.28	2.92	100	171
Housekeeping	6.06	7.32	10.61	4.29	10.86	21.46	0.00	34.60	4.80	100	396
Out of Labor Market	6.19	4.76	10.48	8.57	15.71	33.81	0.48	15.95	4.05	100	420

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

4.4.2. Characteristics of Workers Who Switched Main Employment

From this point we will consider only rural employment and what characteristics may increase or decrease the probability for an individual worker to move from rural agriculture to another sector. We will start by looking at welfare indicators, with poverty status as a proxy. As mentioned earlier, lack of assets perhaps limits individual ability to look for other employment. Indeed, Table 4.5 shows that the nonpoor individuals who started in rural agriculture have slightly better opportunities to move out to services in both rural and urban areas. However, the difference with the poor is not large.

Table 4.5: Matrix of Employment Transformation by Poverty Status, 1997–2014

Main Job in 1997 and Poverty Status	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
Not poor	34.20	16.53	14.20	6.27	2.76	5.27	0.00	9.60	11.12	100	2,104
Poor	37.57	14.80	12.85	6.28	3.35	3.07	0.14	9.22	12.57	100	715
Rural Industry											
Not poor	15.06	17.65	18.35	7.29	10.12	18.35	0.71	7.53	4.94	100	425
Poor	16.09	16.09	16.09	4.60	11.49	16.09	0.00	11.49	8.05	100	87
Rural Services											
Not poor	16.89	10.58	26.21	6.12	5.73	16.89	0.00	9.03	8.54	100	1,030
Poor	21.54	13.85	25.38	3.08	4.62	18.46	1.54	3.85	7.69	100	130

Source: Authors' calculations using data from Rand Corporation (various years), Indonesia Family Life Survey.

People who started as poor in rural industry and rural services were more likely to move out to urban industry and urban services than those who started as being not poor. This indicates that being in industry or services presents more opportunities to move to more productive sectors rather than starting from rural agriculture. It gives a hint about how much more difficult and perhaps costly it is for people in rural agriculture to move to more productive sectors. In other words, if there is a transformation path in the labor market, people who started in agriculture in rural areas may take a longer and perhaps more costly path.

Because "rural" and "urban" are defined as the places where people live, this finding may underestimate people who worked in services or industry in urban areas while staying in rural areas. In rural areas that have better access to urban centers, given geographical advantages or better infrastructure, seasonal work in urban areas is possible.

Table 4.6 tries to capture the gender perspective of employment transformation. In the beginning of this section, we hypothesized that a significant proportion of individuals who transformed to nonlabor market activities were female. This is confirmed by Table 4.6, which shows that a significant proportion of female workers who started working in rural agriculture moved to housekeeping activities.

In contrast, less than 1% of male workers who started working in rural agriculture turned to housekeeping; however, both genders have similar probabilities of moving out of the labor market due to aging or perhaps physical condition (this will be confirmed later after we look at a cohort comparison). This situation is not unique to agriculture, but exists also in rural services and industry. This finding lends support to studies that have found stagnation in female labor participation in Indonesia (Schaner and Das 2016).

Table 4.6: Matrix of Employment Transformation by Gender, 1997–2014

Main Job in 1997 and Gender	Main Job In 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
Male	39.62	17.87	13.37	7.25	3.80	5.14	0.07	0.91	11.82	100	1,419
Female	30.43	14.29	14.36	5.29	2.00	4.29	0.00	18.21	11.14	100	1,400
Rural Industry											
Male	17.69	16.67	18.03	8.84	12.24	19.05	1.02	1.36	5.10	100	294
Female	11.93	18.35	17.89	4.13	7.80	16.51	0.00	17.43	5.96	100	218
Rural Services											
Male	20.45	11.54	22.73	6.47	7.69	19.06	0.35	1.40	10.31	100	572
Female	14.46	10.37	29.42	5.10	3.57	15.14	0.00	15.31	6.63	100	588

Source: Authors' calculations using data from Rand Corporation (various years), Indonesia Family Life Survey.

Table 4.7 summarizes employment transition for workers in rural areas by educational attainment. The results indicate that the higher the educational attainment, the higher the probability to move to other sectors and to migrate to urban areas. This is true even for those who started working in rural agriculture, indicated by the fact that higher educational attainment leads to a lower proportion of people who stay in rural agriculture. The probability of moving to urban industry or services tends to be higher for those who have a higher educational level if they originally worked in rural industry or services.

Table 4.7: Matrix of Employment Transformation by Educational Attainment, 1997–2014

Main Job in 1997 and Completed Education	Main Job In 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
Not completed primary schooling	34.30	10.98	11.43	4.27	1.37	3.51	0.00	12.04	22.10	100	656
Primary	36.57	17.26	13.81	6.44	2.98	4.27	0.06	9.19	9.30	100	1,707
Lower secondary	33.97	22.90	15.65	4.58	3.82	6.49	0.00	8.02	4.58	100	262
Higher secondary	25.70	15.08	17.32	15.08	6.70	11.17	0.00	5.59	3.35	100	179
Diploma/ university	26.67	0.00	53.33	0.00	0.00	0.00	0.00	6.67	13.33	100	15
Rural Industry											
Not completed primary schooling	14.52	24.19	17.74	4.84	4.84	9.68	0.00	6.45	17.74	100	62
Primary	17.15	17.8	19.42	6.15	7.77	16.83	0.97	9.06	4.85	100	309
Lower secondary	11.25	16.25	16.25	6.25	17.50	22.50	0.00	7.50	2.50	100	80
Higher secondary	10.71	10.71	10.71	12.5	19.64	28.57	0.00	7.14	0.00	100	56
Diploma/ university	20.00	0.00	40.00	20.00	20.00	0.00	0.00	0.00	0.00	100	5
Rural Services											
Not completed primary schooling	14.93	4.48	29.85	3.73	6.72	13.43	0.00	11.94	14.93	100	134
Primary	15.76	12.71	27.97	4.41	5.76	17.63	0.00	9.32	6.44	100	590
Lower secondary	10.22	18.25	24.09	4.38	5.84	21.90	1.46	6.57	7.30	100	137
Higher secondary	19.53	9.30	20.47	9.30	5.12	18.60	0.00	7.44	10.23	100	215
Diploma/ university	39.29	1.19	25.00	11.90	3.57	7.14	0.00	2.38	9.52	100	84

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

Table 4.8 summarizes employment transformation for workers in rural areas by age cohort. As expected, younger workers have a higher tendency to move to other sectors and to urban areas. However, more dynamics can be seen in workers who started their main employment in rural industry or services. In each age group, the proportion of

Table 4.8: Matrix of Employment Transformation by Age, 1997–2014

Main Job in 1997 and Age	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
1–15	21.15	28.85	25.00	1.92	5.77	5.77	0.00	7.69	3.85	100	52
16–30	33.91	19.62	19.62	5.48	4.04	6.20	0.00	9.24	1.59	100	691
31–45	39.26	18.22	14.61	7.57	2.90	4.84	0.09	8.71	3.79	100	1,136
46–60	34.82	11.61	9.04	5.40	2.16	4.18	0.00	11.74	21.05	100	741
61+	19.60	5.03	4.52	6.03	1.01	0.50	0.00	7.04	56.28	100	199
Rural Industry											
1–15	8.33	16.67	8.33	16.67	8.33	25.00	0.00	16.67	0.00	100	12
16–30	13.59	18.93	20.87	5.83	14.56	18.45	0.49	7.28	0.00	100	206
31–45	17.91	15.42	17.91	5.97	8.96	21.39	1.00	8.46	2.99	100	201
46–60	14.47	18.42	14.47	11.84	5.26	9.21	0.00	10.53	15.79	100	76
61+	11.76	17.65	5.88	0.00	0.00	5.88	0.00	0.00	58.82	100	17
Rural Services											
1–15	0.00	16.67	33.33	0.00	25.00	16.67	0.00	8.33	0.00	100	12
16–30	17.06	12.97	28.67	5.12	6.14	21.16	0.68	7.17	1.02	100	293
31–45	19.77	10.86	27.71	6.48	5.83	17.02	0.00	6.00	6.32	100	617
46–60	13.08	8.88	19.16	5.61	3.27	12.15	0.00	17.29	20.56	100	214
61+	8.33	4.17	12.50	0.00	4.17	12.50	0.00	8.33	50.00	100	24

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

rural agricultural workers who did not move to other sectors is higher than in industry and services. Moreover, in rural services, age does not matter much, as older workers are apparently able to migrate to urban services.[7]

Finally, Table 4.9 shows employment transformation by working status in rural areas. People who were self-employed in rural agriculture have a higher probability of staying in rural agriculture. Perhaps this self-employment in agriculture is related to landholding, which implies higher returns from agricultural activities. However, a high incidence of staying in agriculture also occurred among family workers. In this case, it may indicate such because unpaid family workers cannot accumulate capital. However, it is also possible that many family workers were women, who tend to play a part-time role in family-based farming.

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[7]   However, considering that people who were older than 60 years old in 1997 were at least 77 years old in 2014, most of them were already out of the labor force in 2014.

Table 4.9: Matrix of Employment Transformation by Work Status, 1997–2014

Main Job in 1997 and Working Status	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
Self-employed	39.49	17.96	11.68	6.10	2.79	4.53	0.00	4.62	12.82	100	1,147
Government worker	20.83	4.17	20.83	20.83	0.00	20.83	0.00	0.00	12.50	100	24
Private sector worker	32.29	14.31	14.13	8.07	4.95	6.24	0.18	9.54	9.91	100	543
Family worker	37.02	19.57	12.02	5.62	2.52	3.49	0.00	11.63	8.14	100	516
Rural Industry											
Self-employed	14.97	17.65	19.79	6.42	8.56	17.11	0.53	4.81	10.16	100	187
Government worker	20.00	0.00	20.00	20.00	20.00	20.00	0.00	0.00	0.00	100	5
Private sector worker	14.35	20.57	13.88	8.13	12.92	19.14	0.96	8.61	1.44	100	209
Family worker	22.22	11.11	22.22	0.00	4.44	22.22	0.00	13.33	4.44	100	45
Rural Services											
Self-employed	13.35	12.41	31.95	4.51	5.45	18.42	0.00	6.95	6.95	100	532
Government worker	34.18	7.65	19.39	7.65	1.02	10.71	0.00	4.59	14.8	100	196
Private sector worker	14.86	9.91	21.17	9.01	9.91	19.37	0.45	5.41	9.91	100	222
Family worker	18.06	15.28	27.78	4.17	4.17	12.50	1.39	11.11	5.56	100	72

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

4.4.3. Structural Transformation in Main Employment among Younger Workers

Sectoral Composition of First Employment of Younger Workers. The labor market structure has changed dramatically for younger cohorts in Indonesia. Table 4.10 shows that the proportion of people who started working in rural agriculture in 2014 was only a quarter of those in 1997. The younger cohort workers have better access to nonagriculture sectors and choose mostly the urban services sector as their first place of employment.

This confirms previous findings by Allen (2016) that younger generations migrate to urban areas, leaving older cohorts in the traditional sector. This could worsen

Table 4.10: Employment Composition of New Entrants

Employment Sector	1997	2000	2007	2014
Rural Agriculture	38.36	37.90	26.12	11.63
Rural Industry	8.26	10.78	11.67	15.00
Rural Services	17.50	17.54	17.28	18.57
Urban Agriculture	4.07	3.52	3.74	5.19
Urban Industry	9.63	10.62	12.61	18.67
Urban Services	22.12	19.64	28.29	30.94
Total	**100.00**	**100.00**	**100.00**	**100.00**

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

productivity in agriculture, not only in terms of productivity per worker but also through technological adaptation. Theoretical frameworks, later confirmed by some empirical works, have shown that lagging technology adaption or dispersion in rural areas worsens traditional economies even more.[8] In free market settings, this may even have a more destructive impact in developing countries, where traditional rural farm activities remain a large part of the economy.

Table 4.11 shows the education profile of new entrants to the labor market: Younger cohort workers have higher education attainment than the older cohort; however, very few of them chose agricultural work.

Table 4.11: Educational Profile of New Entrants to the Labor Market, 1997 and 2014

Educational Attainment	New Entrants in 1997	New Entrants in 2014
Not Completed Primary School	0.72	0.00
Primary School	51.81	17.22
Junior Secondary School	44.34	41.67
Senior Secondary & Above	3.13	41.11

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

Pattern of Employment Transformation of Younger Workers. Table 4.12 shows the employment transformation for the younger cohort of workers who entered the labor market in 2007. Compared with Table 4.4, a smaller proportion of rural agricultural workers remained in the sector by 2014. Most of the young workers were able to move to other sectors within rural areas. However, there is no major difference in migration flows from rural to urban areas between the younger cohort and the older cohort. This implies that there is no speedier path for those who started in rural agriculture to move to urban sectors.

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[8]   See Bueara and Kaboski (2009) and Duarte and Restuccia (2010).

Table 4.12: Matrix of Employment Transformation of New Entrant Workers, 2007–2014

Main Job in 2007	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture	20.00	22.86	22.86	0.00	8.57	5.71	0.00	11.43	8.57	100	3,590
Rural Industry	9.09	9.09	0.00	9.09	36.36	9.09	0.00	18.18	9.09	100	842
Rural Services	7.14	7.14	50.00	7.14	7.14	0.00	0.00	14.29	7.14	100	1,883
Urban Agriculture	0.00	0.00	0.00	0.00	0.00	50.00	0.00	0.00	50.00	100	680
Urban Industry	0.00	0.00	0.00	0.00	44.44	55.56	0.00	0.00	0.00	100	1,136
Urban Services	0.00	10.00	0.00	0.00	10.00	45.00	5.00	30.00	0.00	100	3,536
Unemployed	0.00	20.00	0.00	0.00	40.00	0.00	0.00	20.00	20.00	100	207
Housekeeping	3.85	3.85	3.85	0.00	11.54	15.38	0.00	57.69	0.00	100	2,828
Out of Labor Market	5.61	9.47	8.07	5.26	11.23	25.96	3.16	11.23	13.68	100	1,590

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

4.4.4. Livelihood Diversification

In explaining employment transformation, it is very important to consider the role of second jobs. Shishko and Rostker (1976) and Stevens (1997) found that a second job has the potential to bridge employment transformation. It turns out that in Indonesia most individuals in rural areas have a second job. Low productivity and low returns push workers to take on an additional job to generate sufficient resources for living. On the other hand, most jobs in rural areas provide opportunities to perform a second job, because most of the jobs are informal, which allows more flexible time allocation compared with formal jobs in urban areas.

Table 4.13 shows the sectoral composition of second jobs. In rural areas, most second jobs are in agriculture regardless of the sector of primary jobs. This indicates that most people in rural areas, despite their main jobs, have some activities in the agriculture sector. This is also evidence of a lack of opportunities available outside agricultural activities for those who live in rural areas. Meanwhile, in urban areas, there is a concentration of people with a second job in urban services. This may be related to the easy entry and exit nature of the urban informal services sector.

Does having a second job provide better opportunities to move to more productive sectors? Table 4.14 compares employment transformation in rural areas between workers who had a second job in nonfarm activities and those who did not. The table shows that having a second job in nonfarm activities in 1997 slightly improved

opportunities for workers in rural agriculture to move to other sectors by 2014. For those who started in rural industry and rural services, having a second job in nonfarm activities improved their opportunities to move to urban sectors.

Table 4.13: Composition of Second Jobs in 1997

Primary Job	Second Job			
Rural	Rural Agriculture	Rural Industry	Rural Services	Total
Agriculture	61.68	14.56	24.42	100
Industry	71.30	8.50	20.15	100
Services	69.40	6.58	23.65	100
Urban	Urban Agriculture	Urban Industry	Urban Services	Total
Agriculture	45.12	18.29	36.58	100
Industry	26.40	21.70	51.90	100
Services	22.93	14.30	62.80	100

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

Table 4.14: Matrix of Employment Transformation by Having a Second Job, 1997–2014

Main Job in 1997 and Having a Nonfarm Second Job	Main Job in 2014										
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total	Number
Rural Agriculture											
2nd job	34.77	16.16	13.40	6.07	2.92	4.63	0.04	9.85	12.07	100	2,566
No 2nd job	37.94	15.42	18.58	8.30	2.77	5.53	0.00	5.93	5.53	100	253
Rural Industry											
2nd job	15.98	17.22	17.43	7.05	9.75	18.05	0.62	8.51	5.39	100	482
No 2nd job	3.33	20.00	26.67	3.33	20.00	16.67	0.00	3.33	6.67	100	30
Rural Services											
2nd job	18.10	10.82	25.65	5.60	5.69	16.42	0.19	8.96	8.58	100	1,072
No 2nd job	9.09	12.50	31.82	7.95	4.55	25.00	0.00	2.27	6.82	100	88

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

4.4.5. Determinants of structural transformation in employment

As discussed in section 3, to identify the determinants of employment transformation of workers who started in the rural agriculture sector, we employed a multinomial logit model. However, to obtain results that are more relevant to the current situation, in the analysis we focused on the most recent period of employment transformation in the data from 2007 to 2014.

We start the discussion by presenting the employment transformation dynamics during this period (Table 4.15), which in general shows a similarity with the long-term pattern for the same cohort from 1997 to 2014. People who started in agriculture

tended to stay in the same sector compared with those who worked in industry or services. One interesting finding is that the proportion of those who migrated to urban areas was well spread out in farm and nonfarm activities. From the same data (not shown in the table), about 20% of those who started in urban agriculture were able to move to urban services, but the number of people in urban agriculture was quite small.

Table 4.15: Matrix of Employment Transformation of Workers in Rural Sectors, 2007–2014

Main Job in 2007	Main Job in 2014									
	Rural Agriculture	Rural Industry	Rural Services	Urban Agriculture	Urban Industry	Urban Services	Unemployed	Housekeeping	Out of Labor Market	Total
Rural Agriculture	47.00	17.19	13.37	3.20	1.84	2.59	0.08	6.94	6.60	100
Rural Industry	11.28	18.76	17.81	2.97	8.55	12.35	0.59	7.13	3.21	100
Rural Services	13.49	11.15	28.25	3.03	4.78	11.74	0.05	8.39	3.98	100

Source: Authors' calculations based on data from Rand Corporation (various years), Indonesia Family Life Survey.

Of the total of 3,053 individuals who worked in rural agriculture in 2007, about 48% stayed in agriculture (see Appendix Table A4.1 at the end of this chapter). It also emerges (Appendix Table A4.2) that those who stayed in agriculture were older and less educated (higher proportion of never completing primary school). This is also not a surprising result, given what we already observed in the long-term transition matrix. However, more interesting results emerge from the multinomial logit results.

The multinomial results in Table 4.16 provide some insights about what pull and push factors affect the probability of rural agricultural workers moving out to other sectors. These factors consist of individual and household characteristics as well as the broader working environment and government policies. The coefficients reported in Table 4.16 can be interpreted, if significant, as factors that on average may increase (positive sign) or decrease (negative sign) the probability of moving out from rural agriculture to rural nonfarm, urban farm, or urban nonfarm activities, because the base employment status outcome is defined as staying in rural farm activities.

From the perspective of individual attributes, age and educational attainment have significant effects, while gender and marital status are only partly significant in regard to the probability of rural agricultural workers moving to rural and urban nonfarm activities. Older workers are less likely to move to nonfarm sectors in both rural and urban areas, but they are more likely to move to the urban farm sector. Male rural agricultural workers are less likely to move to rural nonfarm sectors, but gender emerges as not significant regarding the probability of moving out to either urban farm or urban nonfarm jobs.

Education does not matter much in rural economies, as none of the education variables has a significant coefficient on the probability of moving to rural nonfarm sectors. However, higher educational attainment improves the probability of moving to urban areas, but only for those with a senior high school degree; reaching this level of completed schooling has a significant positive effect on the probability of moving to urban nonfarm activities. This indicates that, while basic education remains important, a higher educational level is needed to move into the urban economy.

Table 4.16: Multinomial Results of the Probability of Rural Agricultural Workers Moving to Other Sectors

	To Rural Nonfarm	To Urban Farm	To Urban Nonfarm
Age	−0.00335***	0.000702*	−0.00125**
	(0.000753)	(0.000315)	(0.000393)
Male	−0.0549**	0.0159	−0.00614
	(0.0182)	(0.00824)	(0.00908)
Completed Primary	−0.0269	0.0369***	0.0238*
	(0.0287)	(0.00732)	(0.0108)
Completed Lower Secondary	−0.0345	0.0481***	0.0284
	(0.0371)	(0.0143)	(0.0148)
Completed Upper Secondary	−0.0139	0.0431*	0.0760***
	(0.0402)	(0.0168)	(0.0201)
Completed Diploma Or Above	0.0780	0.0650	0.0483
	(0.109)	(0.0705)	(0.0530)
Married	0.00800	0.00555	−0.0336**
	(0.0231)	(0.0110)	(0.0102)
Having A Second Job In Nonfarm	0.0563*	−0.0293*	0.0174
	(0.0266)	(0.0134)	(0.0116)
Owning Land	0.0422*	−0.0366***	−0.0335***
	(0.0204)	(0.00814)	(0.00899)
Growing Horticultural Crops	−0.0531**	0.00523	−0.0193*
	(0.0185)	(0.00834)	(0.00887)
Wage Gap Between Services & Agriculture	0.0130	−0.00557	0.00970
	(0.0109)	(0.00434)	(0.00541)
Receiving Unconditional Cash Transfer	−0.0163	0.00192	−0.0367
	(0.0347)	(0.0135)	(0.0191)
Two-Wheeled Tractor Assistance	0.0379**	0.0150**	0.0138**
	(0.0122)	(0.00472)	(0.00517)
Plantation Expansion	0.0238***	−0.0200***	−0.0195***
	(0.00700)	(0.00266)	(0.00266)
Farmer Terms of Trade	0.00711***	−0.00359***	−0.00210**
	(0.00105)	(0.000823)	(0.000720)

The dependent variable is employment transition whether individuals stay in rural farm activities, move to rural nonfarm activities, move to urban farm activities, or move to urban nonfarm activities. In this regression, staying in rural farm activities becomes the base outcome. Standard errors in parentheses.
N=3,053, Pseudo-R2 =0.0783, Prob>Chi2 =0.000.
* p<0.05 ** p<0.01 *** p<0.001.
Source: Authors' calculations.

Another interesting finding from individual characteristics is the effect of having a second job in nonfarm activities. It turns out that having a second job gives a better chance of moving out to rural nonfarm activities; but it is the other way around for moving out to urban from rural farm activities. Meanwhile, having a second job in nonfarm activities has no effect on the probability of moving out to urban nonfarm activities directly. Off-farm activities are an important income source for agricultural households in Indonesia (Booth 2002). However, they are mostly still in the context of other farm-related activities. The role of second-job income can evolve from supporting basic livelihoods to financing human capital investment (Booth 2002). Hence, even though the effect of having nonfarm activities does not appear to be significant in our analysis, it could be significant in the longer term. This means, initially, that having a second job in nonfarm activities increases the probability of moving to rural nonfarm sectors, which will then increase the probability of moving into urban nonfarm sectors. However, this is not observable in our analysis, which spans only a 7-year period.

From the household perspective, landownership has a strong influence on holding farmers in rural areas, compared with those who do not own land, although it increases the chance of moving to rural nonfarm sectors. Because owning land provides higher returns from farm activities, it also increases the attachment to rural areas. However, the higher returns also increase the probability of seeking employment in nonfarm activities, without necessarily leaving rural areas.

Meanwhile, farmers who grow horticultural crops, which are high-value, are less likely to move to nonfarm sectors, in both rural and urban areas, than are those who grow other types of crops. Horticultural crops tend to provide greater market incentives and encourage modern technologies that increase productivity. Hence, it can be inferred that these farmers are better off staying in the agriculture sector.

The wage gap between the services and agriculture sectors and receiving government social assistance in the form of conditional cash transfers do not have significant effects on employment transformation. However, the government's agricultural mechanization policy, through providing two-wheeled tractors, has a positive correlation with the possibility of moving out of rural agriculture. This may work through two channels. On the one hand, mechanization replaces manual work; on the other hand, it might be that the government is providing tractors in labor-scarce regions because of urbanization. Because the data are at the province level, it seems that most tractor assistance occurs in provinces with more agricultural production and more plantations. Agricultural mechanization increases the capital-to-labor ratio and the productivity of rural farm activities, while at the same time reducing the demand for labor.

From the external environment, plantation expansion and farmer terms of trade at the province level are two significant factors inducing people to stay in rural areas, as indicated by the negative and significant coefficients for moving to urban sectors. However, these two variables have positive and significant coefficients for moving to nonfarm activities in rural areas. This points to the importance of forward linkages from improving conditions in the agriculture sector to the rural economy in general by providing more economic opportunities in rural areas.

Last, we also tried to add a regional fixed effect of Java versus non-Java to isolate region-specific unobservable factors that might affect the results. Since the majority of Indonesian farmers live on Java, it raises the possibility of a different agricultural and institutional setting influencing the outcome, even though we have already controlled for several province- and district-level characteristics. Using a regional fixed effect, our findings still hold (the results are presented in Appendix Table A4.3).

4.5. Conclusion and Policy Recommendations

Structural transformation in Indonesia has been characterized by faster output than employment shifts from agriculture to industry and services. As a result, the ratio of output contribution to employment contribution in the agriculture sector has fallen relative to the other sectors. The finding from the long-term employment transformation matrix (1997–2014) in this study confirms that people who started working in the rural agriculture sector have a lower probability of moving to other sectors, especially to urban-located sectors. Furthermore, despite the continuing new entry of younger cohorts into the labor market, this dynamic in employment transformation has not changed much during the last 2 decades. This phenomenon may have a role in explaining the stagnation in poverty reduction and the increase in inequality in recent years.

More importantly, the analysis in this study has identified the factors that affect the probability of employment shifts out of rural agriculture. Some of these factors are related to the individual characteristics of workers, while other factors are related to the broader working environment and government policies. The factors that increase the probability of workers moving out of rural agriculture are higher education level and agricultural mechanization. On the other hand, the factors that reduce the probability of workers moving out of agriculture are being male, age, and planting of high-value crops.

Meanwhile, having a second job, owning land, plantation expansion, and higher farmer terms of trade increase the probability of rural agricultural workers moving to other

sectors within rural areas, but reduce the probability of moving to urban sectors directly. However, once a rural agricultural worker has moved to another rural sector, he or she will have a higher chance to move to an urban sector.

These findings have several important implications for policies to encourage faster employment transformation away from rural agriculture: First, expansion of education in rural areas up to the senior secondary level is one key policy to encourage younger workers in rural areas to seek employment outside agriculture and move to urban areas. Second, a policy to invest more in agricultural mechanization, which will increase the productivity of the rural agriculture sector and reduce the demand for agricultural workers, will also encourage rural agricultural workers to seek employment outside farm activities.

However, this policy should be followed by diversification of agricultural products. Promoting more productive crops to replace staple crops is important to avoid unemployment as an undesirable effect of mechanization. Finally, a policy to provide more investments in rural areas to diversify rural economies will create more opportunities for rural agricultural workers to take up a second job, which will then increase the probability of them moving to nonfarm sectors.

This chapter has shed some light on the employment transformation puzzle in Indonesia. However, several related questions still need to be investigated in future studies: First, how do workers' decisions to move out of rural agriculture affect their and the next generation's well-being? Second, what types of education really support the employment transformation process? Third, what roles do community-level variables, including social norms and culture, play in determining the employment transformation process? And fourth, how (and why) do regions vary in the pace of their employment transformation?

Appendix Tables

Table A4.1: Change in Employment Status from Rural Agriculture, 2007–2014

Employment Status	Number	Percent
Stay In Agriculture	1,456	47.66
Move To Rural Nonfarm	1,274	41.7
Move To Urban Farm	142	4.65
Move To Urban Nonfarm	183	5.99
Total[a]	**3,055**	**100.00**

[a] Later, we dropped 2 observations due to missing individual information so that the total observations for multinomial logit analysis were 3,053.
Source: Authors' calculations.

Table A4.2: Summary Statistics of Agricultural Workers by Stability or Change in Employment Status (Mean)

	Stay in agriculture	To Rural nonfarm	To Urban farm	To Urban nonfarm	Total
Male=(1)	0.616	0.575	0.721	0.682	0.608
	(0.486)	(0.495)	(0.450)	(0.467)	(0.488)
Age in 2014	45.230	41.340	45.500	36.150	43.120
	(13.530)	(13.560)	(12.380)	(14.520)	(13.780)
Never Attended School in 2007	0.160	0.131	0.062	0.064	0.138
	(0.367)	(0.338)	(0.242)	(0.245)	(0.345)
Completed Primary in 2007	0.621	0.590	0.682	0.490	0.604
	(0.485)	(0.492)	(0.467)	(0.502)	(0.489)
Completed Junior Secondary in 2007	0.134	0.150	0.171	0.191	0.146
	(0.341)	(0.358)	(0.378)	(0.394)	(0.353)
Completed High School in 2007	0.080	0.119	0.078	0.242	0.105
	(0.272)	(0.324)	(0.268)	(0.430)	(0.307)
Completed University in 2007	0.004	0.009	0.008	0.013	0.007
	(0.067)	(0.093)	(0.088)	(0.113)	(0.083)
Log Difference of Agriculture and Service Gap (2007–2014)	−1.271	−1.176	−1.153	−1.005	−1.211
	(0.870)	(0.806)	(1.301)	(0.874)	(0.872)
Owned Land in 1997	0.745	0.754	0.519	0.599	0.730
	(0.435)	(0.430)	(0.501)	(0.497)	(0.480)
Ratio of Total Number of Two-Wheel Tractor Assistance to Number of Agricultural Households (times 1000, from 2007 to 2014) at Province Level	0.664	0.635	0.680	0.717	0.656
	(0.227)	(0.230)	(0.199)	(0.249)	(0.229)
Has Second Job in Nonfarm Activities in 2007	0.112	0.130	0.078	0.172	0.122
	(0.316)	(0.337)	(0.268)	(0.379)	(0.327)
Plantation Expansion (Ha) Yearly at Provincial Level	5.515	5.988	4.419	4.739	5.616
	(1.909)	(1.844)	(2.444)	(2.252)	(1.975)
Average Change in Absolute Terms of Trade from 2007 to 2014	9.14	10.41	8.048	9.03	9.61
	(8.53)	(9.41)	(6.72)	(5.64)	(8.73)

ha = hectare.
Note: Standard deviations in parentheses.
Source: Authors' calculations.

Table A4.3: Model with Regional Fixed Effects

	To rural nonfarm	To urban farm	To urban nonfarm
Age	-0.00334***	0.000712*	-0.00125**
	(0.000752)	(0.000316)	(0.000394)
Male	-0.0562**	0.0156	-0.00642
	(0.0182)	(0.00825)	(0.00909)
Completed Primary	-0.0280	0.0367***	0.0236*
	(0.0286)	(0.00730)	(0.0108)
Completed Lower Secondary	-0.0309	0.0490***	0.0291
	(0.0371)	(0.0145)	(0.0149)
Completed Upper Secondary	-0.00684	0.0448*	0.0780***
	(0.0404)	(0.0174)	(0.0207)
Completed Diploma or Above	0.0795	0.0651	0.0488
	(0.109)	(0.0705)	(0.0531)
Married	0.00900	0.00573	-0.0335**
	(0.0231)	(0.0110)	(0.0102)
Having a Second Job in Nonfarm	0.0562*	-0.0296*	0.0173
	(0.0265)	(0.0134)	(0.0116)
Own Land	0.0427*	-0.0364***	-0.0335***
	(0.0204)	(0.00814)	(0.00899)
Growing Horticultural Crops	0.0118	-0.00590	0.00943
	(0.0109)	(0.00436)	(0.00543)
Wage Gap Between Services & Agriculture	-0.0140	0.00266	-0.0361
	(0.0348)	(0.0135)	(0.0191)
Receiving Unconditional Cash Transfer	0.0481***	0.0186**	0.0166*
	(0.0134)	(0.00697)	(0.00663)
Two-Wheeled Tractor Assistance	0.0392***	-0.0187***	-0.0182***
	(0.0101)	(0.00328)	(0.00351)
Plantation Expansion	0.00845***	-0.00344***	-0.00191*
	(0.00123)	(0.000850)	(0.000782)
Farmer Terms of Trade	0.0118	-0.00590	0.00943
	(0.0109)	(0.00436)	(0.00543)

Standard errors in parentheses.
N=3,055, Pseudo-R^2 =0.0793, Prob>Chi^2 =0.000
* $p<0.05$ ** $p<0.01$ *** $p<0.001$.
Source: Authors' calculations.

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