



China's second round of forest reforms: Observations for China and implications globally[☆]

Jintao Xu^{a,*}, William F. Hyde^b

^a National School of Development, Peking University, Beijing 100871, China

^b 1930 South Broadway, Grand Junction, CO 81507, USA



ARTICLE INFO

Keywords:

Forest tenure
Household management
Collective management
Devolution
Uncertainty
Policy design

ABSTRACT

This paper provides an overview of recent forest tenure reform in rural China and a summary of findings from a series of surveys and research papers. The research papers cover several broad themes, including the impacts of enhanced policy stability, expanded farmer household forestland holding, and longer contract periods as well as a richer bundle of tenure rights, on farmers willingness to invest in money terms and labor inputs in forestry activities. The tenure devolution process is found to be influenced by the village political environment and by farmers' abilities as well, as outside monitoring and evaluation. This paper concludes by drawing implications from China's experience for international communities under similar trends of forest tenure devolution.

1. Introduction

The first round of China's forest reforms began shortly after the initial agricultural reforms in 1978 and largely followed the approach of the latter—focusing on the forests of the agricultural collectives and essentially disregarding, at that time, the approximately 40% of China's forests that remain state owned. The principle feature of those first round reforms was the transfer of management rights from a large share of collective forestlands to management by individual households. Subsequently, the central government also eased the controls on the price of timber sold by the new managing households.

The household gains from these reforms and the increase in forest stock were impressive in some regions. They were not so substantial in other regions and the authorities rescinded some household rights by the mid-1980s. These experiences have been reviewed elsewhere (Lin, 1992 and McMillan and Naughton, 1992 for agriculture; Yin and Newman, 1997, Yin and Hyde, 2000 and Hyde et al., 2003 for forestry).

Our interest in this paper is in the second round of forest reforms that, beginning in the late-1990s, expanded on those prior reforms, notably establishing more secure household rights, extending the duration of household contracts for collective forests and permitting some transfers of these contracts.

Peking University's College of Environmental Science and Engineering under the direction of the lead author of this paper

conducted two large surveys of 2490 households managing 44,547 forest plots in 264 villages from eight of China's 31 provinces, one in each of eight broad regions. All eight sampled provinces had formally authorized the second round of forest reforms by 2010. The surveys, conducted in 2006–07, and again with the same households in 2011, collected information on forested plots allocated under various categories of household use rights; each household's perceptions of their forest tenurial rights, contract periods, harvest and investment levels; and its allocation of household labor, consumption patterns and demographic characteristics. The same surveyors, and at the same time, collected revenue information from the village collectives and information on both forest production and stand characteristics from the local forest authorities from year 2000 as well as the survey years. (See Xu et al., 2015 for detail on the sampling procedure, the surveys themselves, and their summary data.)

Research faculty and students at Peking University, together with colleagues at the World Bank, Resources for the Future and Gothenburg University, used these data in inquiries into the effects of the second round of China's reforms. This paper is a summary of their research results and their published papers. Their essential observations fall within three themes:

- The effect of policy uncertainty on household managers or, what is the same, the household manager's confidence that policy will be

[☆] This article is part of a special issue entitled, "The experience of China's forest reforms: What they mean for China and what they suggest for the world" published at the journal Forest Policy and Economics 98C.

* Corresponding author.

E-mail address: xujt@pku.edu.cn (J. Xu).

<https://doi.org/10.1016/j.forpol.2018.04.007>

Received 19 January 2018; Received in revised form 18 April 2018; Accepted 18 April 2018
Available online 03 May 2018

1389-9341/ © 2018 Elsevier B.V. All rights reserved.

consistent over the household's period of forest planning and investment.

- The devolution of forest use rights from centralized village collective management to increasing but, as yet, incomplete management rights for individual households—and the potential gains from further reforms. This discussion leads us to questions of effective policy design.
- An underlying assessment of who benefits.

With each of the three, there are both obvious conclusions for China and also important implications for forestry in the rest of the world.

We will begin with a summary of the fundamental components of China's second round of forest reforms and then add a few words regarding their implications beyond China for important questions of global forestry. The body of our paper summarizes each of six empirical assessments of these second round impacts. A final section draws conclusions from these empirical assessments as they relate to the three essential themes identified in the previous paragraph.

2. China's recent forest reforms

2.1. The 1990s

The central government's announcement in 1992 that it was establishing a market economy began a period of gradual, varied, economy-wide but locally opportunistic market-oriented reforms. In the forest sector, land use rights were further diversified as additional plots of collective forest were auctioned or leased to individual investors and forest product companies as well as to farm households. Timber sales and market distribution underwent their own transition with the abolition of the state procurement and pricing system. Nevertheless, the forest economy in China's south remained sluggish, contributing little to local development and well-being. Many households in forested locales continued to live below China's annual poverty line of 637 yuan per person (less than US\$70 in 1992).

China's aggregate economy had grown rapidly from the beginning of market reforms in 1978, and it continued to grow at a double digit annual rate through the 1990s. China's population grew to expect rapid growth and the central government looked for ways to maintain the growth and also extend the benefits of economic development to lesser developed regions and lagging rural areas.

Growth in the rest of the country created increasing demands for forest products and for the full range of forest ecosystem services. Aggregate growth, along with a decline in government revenues from forests, meant that the government's own opportunity cost for forest reform was small. (That is, as revenues from the collective forest sector were a small and decreasing share of all government revenues, policymakers confronted less resistance to recommended change in the sector.) Furthermore, progress in the agricultural sector meant that the more stringent policies for the forest sector were very much apparent to the rural population. Finally, many anticipated that a more vital forest sector might be a crucial consumer of surplus rural labor. This combination of factors placed the central government and the local authorities in a position to address the challenges of the forest sector. It is from this background of experience that the forests of China's collectives attracted renewed attention over the last years of the 20th and into the first decade of the 21st century.

As often the case in China, the new reforms began as local ventures in various locations. The more successful of them were observed in neighboring counties and, as these successes became recognized more broadly, the Central Committee of the Communist Party (CCCP) and the State Council eventually formalized them as national policy.

- In 1993 CCCP Document No. 11 approved the extension of household use rights for forest land to 30 years, eventually extended, in 2008, and then to 50 and even 70 years. The Land Management Law

of 1998 provided for the renewal of these rights upon maturity.

- Households began transferring use rights for private plots to others within the same village in the early 1990s. The Revised Forest Law (RFL) legalized these transactions in 1998 with the stipulation that written contracts accompany the transfers.
- The province of Fujian had declined to participate in the early reforms. Fujian's alternative approach, giving villagers paper shares in their collective forests, altered little—maintaining most collective forests under the continued control of the Village Councils. Forest management and productivity remained low. However, in 1998, one village in Fujian began transferring the rights from the collective to its households. Other villages followed. The revenues that were generated provided significant rents to these villages and helped eliminate village debt.

3. The second round of forest tenure reform

These local actions were preface to a sequence of formal policy decisions known together as China's second round of forest tenure reform. They authorized the steady devolution of collectively-held rights and improvement in household forest tenures.

- The Rural Land Contract Law (RLCL) in 2002 extended household rights to include transferring, inheriting, and mortgaging the rights to agricultural land use. It permitted transfers to other villagers and to non-villagers with permission from the village collective. As a result, those more restrictive forest policies that remained stood out all-the-more clearly—and were all-the-more more susceptible to criticism.
- CCCP Document No. 9 in 2003 extended the RLCL, reiterating the intention to devolve collective forests to individual villagers. This was an attempt to make forest sector policy consistent with that for agriculture. It authorized villages to reallocate as much as 90% of their collective forests to households.
- By 2006 the central government had become convinced of the merit of tenure reform for the forests of the collectives and it recognized the need for coherent national guidance. The Minister of the State Forestry Administration announced that tenure reform was his first priority, an announcement that coincided with the central government's New Countryside Development Initiative (NCDI) which called for more assistance to rural areas, stronger property rights, and a more favorable policy environment for the rural poor. The NCDI was a clear reflection of growing concern with rural unrest.
- The CCCP and State Council announced its "Guidelines" in 2008. The Guidelines drew from the RLCL and Document No. 9 but placed specific emphasis on forest reform. The Guidelines clarified user rights and repeated the authorization for villages themselves to reassess and reallocate use rights. The village collectives were instructed to implement these reforms within five years.
- The Guidelines also assured that land could not be taken for commercial or public purposes without compensation to the holder of the use rights. In addition, they stated that the government would reorganize forest administration, reform tax policy and harvest regulations, restructure the financial system to permit the use of land and timber as collateral for loans, and arrange local centers to facilitate timber and land transactions.

The principles under which land use rights devolved, first to households and, eventually, to other agents had been established during the first round of forest reforms in the early 1980s. The second round, through 2008, had more to do with following through with these principles: with completing the registration of contracts, with titling and demarking the boundaries associated with the devolution to individual tenure, and with transferring the decision making authority for the reallocation to local communities. The magnitude of land reallocation from this second round of reforms was less than in the first

round. Nevertheless, over 62 million hectares transferred from collective to household management and over 72 million households held certificates for forest land use by 2008. Twenty provinces had announced their participation in the new round of reforms by 2010.¹

Because this sequence of gradual and progressive improvements in household use rights occurred at somewhat different rates in different provinces, and occurred without the reversals and the resulting uncertainty of the first round of forest reforms, it could be separated into a linear series of individual components that, in empirical assessments, could be tracked either individually or in combination.

4. Global perspectives on forests and forest reform

The modern global discussion of forest reform has three essential components. The first, redistribution away from state forest management and ownership commonly known as devolution, has been a central topic for both policymakers and practitioners. The second and the third, the process of improving local rights to the forest and, therefore, the condition of the forest itself, and the question of who benefits, must surely become important as devolution is implemented in various forms in various locations and as we begin to observe performance of those forests under new management.

4.1. Devolution

Land reform is a central theme in general discussions of economic development, and land redistribution favoring smaller rural households is widely understood to be a positive step toward the alleviation of poverty and the generation of robust growth and development. The land reform discussion has generally referred to agriculture but, in recent years, it has taken additional meaning for forestry.² The redistribution of forest land has favorable effects on local poverty and development similar to those for agriculture, but it arguably has an additional positive affect limiting forest degradation and deforestation.

Perhaps 70%, or even more, of global forests are centrally managed (White and Martin, 2002). Therefore, the discussion of land redistribution in forestry tends to focus on the “devolution” of managerial responsibility away from state management. As the argument goes, local land managers have better knowledge of the specific characteristics of their forests, they can manage their forests less expensively and for greater benefit, therefore more sustainably, thereby having favorable effects on global change, biodiversity, local watersheds, and the general quality of life—all of which are of surpassing global environmental concern.

Most of the experience with devolution to date has been partial, incorporating local participation in the decisions of state managers, but not continuing beyond that to the transfer of full responsibility to local managers. “Community participation” in national forest management in the US and “joint forest management” in India are among the examples. Nepal’s experience with panchayat forestry, transferring state forests to community management, is another, more complete, example. The broader global policy recommendation seems to be for expanding the transfer to local collective management—as in Nepal. Continuing the redistribution beyond that, to individual private managers as, in China, has seldom been a part of the discussion of devolution to date.

¹ Jintao: comment on subsidized forest insurance and low interest loans. Perhaps something like: There were other reforms as well; for example, subsidized forest insurance and low interest loans; but neither of these had large or widespread impact and neither was mentioned in any of our survey of households. Or, say whatever you know to be the case!

² Some form of improved tenure underlies the improved provision of almost every forest resource product or service: biodiversity (including wildlife poaching), carbon sequestration with the objective of affecting the global climate, watershed management (erosion and downstream flooding), less marketed forest products like some tourism and many non-timber forest products, and even many cases of commercial timber (including policy concerns for trespass and illegal logging).

The policy recommendation for devolution should cause us to inquire of the historical experience. Has there been relevant prior experience and what does it tell us? In fact, there is a history of successful collective land management by small communities for the benefit of all members of the community. The small common grazing square at the center of New England towns in colonial America is an example. The much larger modern collective grazing lands of Botswana may be another (Runge, 1981). The observation to be taken from this experience is that unusually homogeneous communities may be able to successfully manage a resource for the regular benefit and long-term interest of all participants.

Nevertheless, an extensive collection of experience paints a cautious picture. (See Andersson and Agrawal, 2011 and Hyde, 2016 for reviews.) More often than not, class division and unequal access to local political power characterize the local community. Specialized groups, generally the politically influential and better-off, dominate decisions on use of the common resource, while those who are less well-off are limited in, or even deprived of, access to the resource. Indeed, while the proponents of these ideas discuss the merits of devolution from state to community management, they often express concern that better-off members of the community capture most of the resource benefits.

Are there exceptions? Are there other collective institutions with more durable histories or can we conclude that successful collective community activity is a short-term phenomenon, and that policy makers and managers should be alert to whatever might happen as the community eventually diversifies and its previous homogeneous interests in the common forest resource diverge? If so, is China’s experience instructive?

5. The process of improving local forest use rights

As we anticipate more transfers of forest use rights from central to local authority, we can anticipate inquiry about the best first steps to the transfer. Should central authorities simply make formal transfers of the use rights directly and quickly or, if productive and sustainable local management is the objective, might there be more useful detail to the transfer process?

In fact, two details come to mind. The experience from China’s first round of forest reforms demonstrates the crucial importance of uncertainty for any long-term management decision. In the presence of uncertainty, managers harvest rapidly, while they still have the opportunity, and do not reinvest. They invest and manage their lands sustainably only when confident of their ability to claim the eventual rewards of their investments. Therefore, a reliable climate for confident longer-term decision making is a prerequisite for successful land transfer and management.

The agricultural literature raises another question. Are secure land use rights a prerequisite for investment and, therefore, is the transfer of rights a best first step, or is it the investment itself that stakes the claim, thereby ensuring the manager’s possession of the land and establishing the right to future benefits from the land? Most of this literature is taken from experience with cropland at the frontier of development in Africa and Latin America. It is inconclusive regarding the causal direction of the link between tenure and investment—although it leans toward the argument that improved and secure tenure precedes and provides an inducement for investment. (Yi et al., 2014 review this literature.) This leads us to inquire of China’s experience regarding the causal link between secure rights and investment. Is it consistent with that in agriculture? Is it relevant for forestry elsewhere in the world? In either case, policy will be most effective if it leads with encouragement for that activity, tenure or investment, which induces the other.

5.1. Who benefits

Finally, we might consider the global experience with forest products. While numerous forest products contribute to local welfare, one

product, fuelwood, is locally consumed virtually everywhere there is forest, but especially by poorer communities in less developed regions. The literature on fuelwood suggests that rural communities follow economic expectations with regard its production and consumption, collecting and consuming less and substituting both alternative sources for their fuelwood and alternative fuels when fuelwood at the primary source becomes scarcer. Some of this literature identifies key differences, however, among the local citizenry. Who gains and who gains most? Most of the literature originates from a few South Asian observations. (See Hyde and Kohlin, 2000 for a review.) Will China's experience support the general South Asian observations? What about selective differences between ethnic and income groups or among those with alternative means of employment and income.

6. Questions arising from China's second round of reforms and these global perspectives

Five questions and a smaller number of related queries emerge from China's experience and the global discussion.

First, does uncertainty regarding the permanence of policy, the reliability of the possession of forest use rights, or the access to the future benefits of managerial effort remain an issue in the minds of those Chinese households that possess the new forest use rights? The second round of China's forest reforms has been a linear sequence of progressively improving land use rights. The previous pattern of giving rights, and then periodically rescinding some of them, seems to be a thing of the past. But do the households who have received the rights continue to act with caution born of their older experiences?

Second, is China's example instructive regarding the causal link between secure land use rights and investment? What has been the direction of this link during the China's period of forest reform? Is China's experience comparable to that observed for agriculture in Africa and Latin America? Can we identify local characteristics that explain any differences? This is an important question. If we can identify which precedes the other, secure rights or investment, then we have identified the policy that is the most effective first step in successful devolution.

Third, how does the process of devolution operate and what are the costs associated with it. Any transfer implies transactions costs of some form. What might those be, and how great are they? Do China's authorities impose transactions costs of some form, or do they extract other personal benefits from the transfer. China's experience should be suggestive of where such transactions costs impose a burden either for further transfers of land use rights in China in the future, or for similar transfers elsewhere.

Does China's experience, or that elsewhere, suggest limits to devolution? What are the conditions under which the transfer from state management to management by local collectives is permanent and sustainable? Where collective management is not sustainable, then what can we anticipate about the next step in the devolution process and what are its characteristic advantages?

One argument for collective management has been that a collectively managed resource provides a safety net during times of unusual duress. (See Sunderlin et al., 2003 or Fisher and Shively, 2005 for reviews.) In forestry, the collectively managed resource acts as insurance, as a "social safety net" with harvestable product untapped in normal times, but available for stressed individuals and households at the time of their unusual need. Does China's experience provide evidence that forests can or do act as social safety nets? And is this necessarily a characteristic only of collectively managed forests?

Fourth, in all of the empirical assessments reviewed in this paper, regardless of the specific findings in any of them, one question always has to be what those findings suggest for continuing further policy reform in China. Is there opportunity for further reform? What would the new reforms look like and how would we describe their potential?

Fifth, what are the welfare gains associated with China's second round of forest reforms? Three queries: a) China's authorities

anticipated that the new individually managed forests would become an outlet for excess rural labor. Were their expectations well taken—or misguided? b) Do some groups benefit more than others from the reforms and the new rights? We previously identified the concern that village elites capture larger shares of the benefits from joint or community management. c) Finally, equity, development, and the rural poor are points of discussion for most any forest policy. Concern for each played a part in China's leaders' design of the second round of forest reforms. Do we observe an impact on any of these?

7. The empirical evidence

The raw data from the surveys provide insight to the first question. Policy uncertainty was a crucial deterrent to investment in some regions during the first round of forest reforms. Did uncertainty regarding the permanence of policy remain an issue in the minds of those who received new forest use rights during the second round of forest reforms?

For the full eight province sample, the collective forest area contracted to individuals, groups, or outsider timber harvesters increased by 18% or at a rate of approximately 1.5% annually from years 2000 to 2010. Only two provinces, Anhui and Zhejiang which already had contracted large shares of their collective forests by 2000, showed slight decreases by 2010. (Once more, see Xu et al., 2015 for these data.)

This is encouraging information. However, the households' own perceptions of their forest user rights and their actual forest investment decisions are more revealing of any remaining uncertainty. The surveys inquired of perceptions of two arrays of increasing forest use rights (rights to harvest NTFPs, to select or convert tree species, to convert to agricultural production; and the rights to transfer land to other households within or outside the village or to mortgage the land). Not surprisingly, within each array, household perceptions improved from 2005/6 to 2010. They improved consistently from less to more complete rights and over time as well for the average of all sample households in each of the eight provinces. Finally, the mean level of forest investment for the sample households increased 123% between 2000 and 2005/6. (Investment data were unavailable for 2010.) As it did, the forest stock grew and timber harvests increased continually between 2000 and 2010 by an average of 268% per province.

This evidence is convincing. Any remaining policy uncertainty must have declined with time. Either policy uncertainty was no longer an issue in the minds of household forest managers, or it had declined very substantially before China's second round of forest reforms.

8. The causal relationship between property rights, tenure and investment

That there is a link between land use rights and investment is well-known, and it is especially well-known in China. However, the causal relationship between these rights and investment is not well understood. Do improved rights (improved tenure) induce the investment that increases productivity? Or is it the other way around—and it is the investment that helps establish secure rights and the increase in productivity that follows? Which precedes and provides the foundation for the other? Therefore, which is the more effective initial focus for policy? That is a crucial question—both for China and its interest in potential further reforms and for the many global forest issues for which tenure is so central.

The question is not just about formal measures of investment tenure. For the household manager, perception is critical, perception of the land use rights themselves and of their security. China learned, in the 1980s, that the perception of security, or investor confidence in the property rights, is important, but just how important? Is it more or less important than the formal rights themselves, or than other characteristics of the household that holds the property rights, characteristics such as individual wealth or political connections?

Yi et al. (2014) examined the relationship between the household's perception of its rights, the rights themselves, and investment. Their approach followed Besley's (1995) classic assessment of household agricultural investment but they described of forest land as an asset with longer-term returns than the more common annual returns from the household's primary agricultural activity. Besley's formulation shows that, in three specific and highly relevant cases, tenure and investment are endogenous in some proportions between zero and one.

1. Perceived security of tenure is a function of the formal rights, prior investment, and demographic variables and forest characteristics.
2. Investment is a function of the perceived security of tenure, prior investment and demographic variables and forest characteristics.
3. Investment is a function of the formal rights, prior investment and demographic variables and forest characteristics.

The problem is to assess those proportions, the coefficients on the independent variables in the three equations, for households that possess rights for different levels of management of their forest lands. Positive and statistically significant coefficients on the measure of prior investment in the first equation would validate the presence of endogeneity.

Yi and her colleagues assembled a series of econometric estimations to examine these relationships for each of nine disaggregated forest use rights as well as for an index of aggregated rights.³ They corrected for heterogeneity, selection bias and fixed geographic effects. Disaggregated tenurial rights as well as the index of aggregated rights were largely positive and statistically significant in the various specifications of the first equation. That is, there was a strong correlation between the household perception of secure tenure and the strength of formal contracted use rights. However, the effect of prior investment on household perceptions, while positive, was not nearly statistically significant. Therefore, Yi and her colleagues concluded that in China, in contrast with some experience from Africa, the security of tenure was not enhanced by investment.

In specifications of the latter two equations, household perceptions were not a significant determinant of investment, but formal rights were a positive and significant determinant. Apparently, formal rights affected household perceptions of tenurial security, but they did not affect investment through these perceptions.

Yi and her colleagues also inquired of the unique household and village characteristics that might affect investment decisions. None had impacts as great as the effects of improved formal rights. Nevertheless, it was clear that households with more forests and more commercially productive forests were more aware of the relative security of their forest tenures and were more likely to invest in their forests. It was clear that village leaders and Communist Party members had better information and some used their positions to their investment advantage.

A life cycle pattern to investment was also apparent: That is, young households tend to harvest their forests to support increasing family needs but they cannot afford much investment. Mid-career families tend to be larger and they do invest. For them, the rights to their land will be more important. They have both the time and the financial capital to invest and they have reason to anticipate a future return from their forests. Mature families are smaller and they disinvest as they anticipate less personal future demand from the productive potential of their forests and, in China, they may anticipate future eventual egalitarian reallocation of their forest lands to other households.⁴

³ The measure of perceived security of tenure was the household's anticipated likelihood of holding a forest plot for five years. Measures of the other variables are straightforward.

⁴ Binkley (1981) first showed this life cycle pattern of investment for small farm/forest households in New Hampshire in the US. Hyde (2012) discusses its broader global occurrence.

9. Factors affecting the transfer from collective to household management

The second round of forest tenure reforms encouraged the redistribution of the village collective forests to individual household managers. However, the redistribution was not always immediate or complete. And when redistribution did occur, some village leaders retained some control, even extracting payments from some of the household managers who received the new rights.⁵ More than 20% of households in the Peking University sample reported making these payments, a share that rose to 59% of households in some years and in some provinces.

The question for Xu et al. (2017a) had to do with the transfer process. What characterized those cases where the forest transfers went directly to individual households, as the policy intended, and what characterized those others where the transfers were not that simple? The practical form of the question become one of contrasting the characteristics of those involved in the transfer of the collective forests in four separate cases, two of village leaders who either imposed payments or did not and two of households who either paid remittances to these leaders or did not.

Xu et al. regressed the likelihood of either paying or not paying remittances as functions of the same local economic conditions, characteristics of the households and the village leaders, and several descriptors of conditions in the local village, including local experience with both agriculture and forest reforms. Their results demonstrate a satisfying consistency. That is, signs on coefficients in the first set of regressions indicating a positive effect on the likelihood of making remittances generally match negative signs on the same coefficients for the second set of regressions indicating the likelihood of not making remittances. Similarly, negative coefficients in the first set generally match positive signs on the same coefficients for the second set.

The regressions show that long-serving village leaders were the most likely to collect remittances and they were more likely to collect from households with off-farm employment opportunities and in villages with better access to larger neighboring towns. Village leaders with less experience and from more remote villages but villages where forestry or village-owned enterprises were greater contributors to the local economy were less likely to impose remittances. In addition, leaders of villages that had previously experienced frequent agricultural land reallocations and that included a larger number of civic associations were also less likely to collect remittances. Finally, better-educated households were less likely to pay remittances and better-educated village leaders were less likely to impose them.

In fact, this combination of personal and village characteristics is easily explained. Village leaders who are more established in their positions are more able to impose their own preferences, and that includes the preference to use their position for personal financial gain. Obtaining a fee from a single village-owned enterprise is probably easier than obtaining remittances from many individual household forest managers. However, the latter remains an option for many established leaders. In villages where the leaders do impose remittances, villagers with other sources of income (off-farm employment) may simply choose to pay the remittance and concentrate their personal effort elsewhere. They may even seek alternative off-farm employment as a way to minimize the effect of the less desirable impositions of their village leaders. Of course it is also true that off-farm employment opportunities are more readily available in villages with better access to larger neighboring towns. In the same villages, those leaders who are newer are likely to be less secure in their positions but also younger and better educated, therefore more accepting of external direction from

⁵ These payments may have been used for local public services for the entire community's benefit, for management of the remaining undistributed common forest, or for village leaders' personal gain. In any event, their payment affected the reallocation of collective forestlands.

provincial authority, including direction regarding forest reforms, and they are less likely to impose remittances.

On the other hand, in more remote villages, while more established leaders still have the advantage of their position, forest income may be more important to the community and, therefore, households may be better informed about provincial forest policy. Furthermore, the remoteness of their village may also mean greater very local social interaction, particularly where there are more community organizations offering opportunity for civic discourse. The payment of remittances is less likely under these conditions.

The behavior of those village leaders who impose remittances may be due to a belief, as some of those leaders argue, that they are protecting the common forest resource for the community's benefit. In other cases, the village leaders were simply protecting their own personal interests and seeking personal financial gain. In either case, imposing remittances on the new household managers was contrary to the intention of the original policy and it is contrary to the interests of the new household managers. It raises two new questions. First, the general question of process: When devolution is discussed more broadly and globally, the process of devolution and the possibility, even the likelihood, of administrative losses such as China's remittances occurring during the process of transferring the forest use rights is not part of the common discussion. It should be.

Second, for China, if it is a policy objective to improve the implementation of the reform; that is, to redistribute more collective forests to individual management without the imposition of local remittances; then future policy might focus on improving the village democratic process—which would decrease the unusual authority of some village leaders. Until that occurs, monitoring and enforcement might focus on those entrenched village leaders, usually in less remote villages where forest product prices are not great and forestry is not as crucial a source of local income. These have been the laggards in the effective implementation of tenure reform.

10. Markets for forest land

The 2008 Guidelines permit the market exchange, as in rental although not more permanent sale, of forest land. Most villages had completed the reforms directed by the Guidelines by 2013 and almost 90% of the collective forestlands had been transferred to management by individuals or group of households. Nevertheless, participation in markets in forest land was limited. Real estate markets anywhere and for any moment in time never include the total of all land in any use class, but the 5% of individually held forests that have exchanged in China seems small. This is a concern because exchange enables any good or service to find higher valued uses and, therefore, its greater contributions to regional growth and development.

Siikamäki et al. (2015) examined the potential for greater market exchange. Their interest was in the market, household and land characteristics that might induce both lenders and borrowers to increase their participation in a rental market for forest land. As it turns out, their interest also contributes insight to four of our more general questions: uncertainty, further reform, limits to devolution, and the relationship between tenure and investment.

Siikamäki and his colleagues conducted a household choice experiment to address their necessarily hypothetical question. They asked a subset of the 2010 Peking University survey participants to address the question of potential markets by choosing among hypothetical rent-in and rent-out (demand and supply) contracts for two classes of land quality. Each contract included as many as six attributes (e.g., price, contract length, payment method, right to sublet, etc.), each with two or more alternatives (e.g., four different price options and four different contract lengths) plus the opt out option—although each individual survey participant was asked only a sub-set of the very large number of total possible alternatives.

Econometric estimations from these choice sets provided the means

to calculate marginal preferences among the attributes and alternatives and, from these, to project demand and supply for forest land and a rental market equilibrium that was remarkably close to the observed (thin) level of market exchange in 2010. Modifying the demand and supply projections to incorporate those attributes and alternatives that were most important for potential tenant (demanding) or landlord (supplying) households allowed these authors to project potential future markets for forestland.

Other than price, prospective tenants placed greatest value on the right to re-rent (or sublet). A 100% re-rental right was worth about 70 yuan/mu (15 mu = 1 ha) beyond even an 80% right. For prospective landlords, the most valuable right was the right to reclaim the land at termination of the contract. Perfect assurance of this right was worth approximately 55 yuan/mu more than the 80% assured right. The 125 yuan/mu combined value of the tenants' right to re-rent plus the landlords' right to reclaim is substantial compared with the actual market rental value in the neighborhood of 250–300 yuan/mu. Policies that assure both attributes as a condition of the traded contract would create a new market equilibrium with about 40% greater household participation at a price more than 10% below the original market. The total area of traded forest offered by households in the survey sample would increase by approximately 25%.

The landlords' assured right to reclaim possession at termination of the contract is all the more interesting because certificates formally identifying the official claimant to land use are a key component of the 2008 Guidelines. Therefore, as the new Guidelines become fully implemented we can anticipate market movement in the direction suggested by the Siikamäki et al. projections. Of course, the effectiveness of this new policy still depends on the manner of its implementation, something we cannot anticipate. Furthermore, there remains opportunity for additional market improvement by revising current policy to allow tenants the right to re-rent, a right that has not yet been established.

The choice experiment provides a second insight that is as important from a broader forestry perspective as the insights to market efficiency; namely, preference for individual rather than joint, group or community management of forestland. Respondents to the choice experiment were allowed the contract option of management by one or multiple households. Their preference for individual household management carried a premium from the perspectives of both potential renters and potential landlords. This observation would seem to contrast with many global policy recommendations for devolution of forest rights extending only to community groups and not beyond that to individual household management.

11. Effects on rural labor

In general, the effect of new or improved tenure is like that of possession of a new resource or of additional confidence in the use of an existing resource. It provides the resource manager with new opportunity. If household managers respond to the new opportunity, then one measure of their response must be through the allocation of an increased share of their labor to the new productive activity.

Three underlying hypotheses come to mind regarding tenure and the reallocation of rural labor. First, the increasing access or more secure access to the forest that comes with tenure reform directly absorbs some otherwise underemployed rural labor. This is an important question for any poor rural community, but it is especially important for those communities, particularly in developing countries, that experience emigration to already congested urban centers where their labor opportunities may not be much greater. China is a clear example. The number of off-farm (migrant) laborers in China grew to 253 million in 2011. Second, and related to the first, as members of rural households gain knowledge of the urban labor market and the employment risks associated with it, improved forest tenure may create an attractive alternative and an inducement for some who emigrated to return to the

rural communities of their origin. Third, forest properties create a backstop opportunity and temporary welfare during periods of economic stress. This is the social safety net hypothesis of widespread international discussion in the literature of forestry and economic development.

To address these three hypotheses Xu et al. (2017b) regressed various measures of alternative household employment on measures of improving forest tenure, on household and local characteristics, and on indicators of the 1997 global financial crisis. Forest employment increased in association with nearly all measures of improved forest tenure. This supports the first, labor tying, hypothesis and, given the large coefficients on the tenure terms (and that other opportunities for local employment were largely unchanged), it suggests that previously underemployed rural workers benefitted as well. This latter was an important political objective of China's second round of forest tenure reform.

In particular, better educated households and households with larger families benefitted from the improved opportunity with increased employment both on their forests and in various off-farm activities. Village leaders and Communist Party members did not generally gain advantage from this labor tying effect of the forest reforms. Apparently they already had preferred opportunities elsewhere. Since these are the better off village elite, this suggests that improvements in forest tenure are beginning to adjust existing imbalances in local village welfare—something that Chen et al. (2016) addressed in a subsequent assessment.

In addition, the opportunity to use the forest property as collateral, the final step in China's reforms to date, opened the opportunity to borrow and, therefore, the opportunity to invest in previously unavailable activity. Some new investment might be on the forest but some, undoubtedly, would be away from the household's forest and some household labor followed this new opportunity away from the forest to local wage employment.

One of the measures of employment was non-local wage employment. This measure allowed Xu et al. to examine the effect of improved forest tenure on migrating labor. Improved forest tenure did significantly decrease migration, as some labor stayed home, or even returned home, to take advantage of new and greater opportunity on the household's forestland.

Improved forest tenure did not deter migration for better educated households, and especially not for those better educated households that also possessed larger forest areas. However, there was a modicum of evidence that some workers from these households who had migrated did return home when their distant employment was negatively affected by the global financial crisis. They returned home to their larger forests and those forests could be considered to have provided a safety net for these households during this period of their economic duress.

12. The effect on consumption: household energy as an example

Yang et al. (2016) were interested in the household's gains in consumption, if any, due to the reforms in China's collective forest tenures. Improved tenure justifies increasing investment, in forests and otherwise and, following the investment, increased production. This increase in production might be consumed in the household of the tenure holder or it might be exchanged in local markets with the producer households receiving income from the sales. The market exchange would create additional wealth, much of which the households could use for additional consumption. In addition, when households use their new certificates of forest possession as collateral for loans and use the loans for new investment, that investment becomes a source of household wealth—with a further impact on household consumption. Altogether, these three reasons create an effect of tenure reform on household consumption.

Yang and her colleagues chose to examine the impact on fuelwood

consumption because fuelwood is the most widely consumed forest product, especially for poorer households in remote and less developed rural areas. In China, fuelwood, together with straw and other agricultural residues, still accounted for 60% of rural energy consumed in 2000 (Joyeux and Ripple, 2007). Increases in its availability would contribute importantly to the welfare of rural households. To capture this effect of improved tenure on consumption, Yang and her colleagues estimated the household demand function for fuelwood, including an explanatory term for improved tenure. Their assessment relied on the 2010 Peking University survey data for Yunnan, a poorer mountainous province that is home to several ethnic minorities. By 2010 many of these households had obtained the forest use certificates that substantially improved their forest tenure.

The basic regression and two identical specifications separating the sample population into higher and lower income households satisfy the usual expectations. Fuelwood was a necessity for these Yunnan households. That is, its own price coefficient is negative and small and the income coefficient is also small. Some substitute on of other energy products, particularly charcoal, occurred in response to higher fuelwood prices. Family size had a small positive effect on consumption, but neither the income share due to off-farm employment nor membership in a minority ethnic group made significant differences in these regressions.

The coefficients on tenure reform (calculated as the ratio of individually managed forest land divided by the total area of collective forestland for each sample village) are the most interesting result. They are positive and significant, and they are larger for households with annual incomes less than 60,000 yuan than for higher income households (0.790 and 0.582, respectively), suggesting that improvements from the second round of tenure reform created relatively (although not absolutely) greater welfare improvement for lower income households. All households benefitted, but lower income households benefitted relatively more. A 30% increase in the ratio of new household forest tenures, as was the general experience in Yunnan over the period from 2000 until 2010, was associated with a 24% adjustment in fuelwood consumption for lower income households. Higher income households adjusted their fuelwood consumption by a smaller but still significant 18% in response to the same 30% increase in individual forest tenures over the same 10-year period. The greater impact on lower income households is especially important in the context of the central government's desire that tenure reform should have a beneficial impact on poorer communities.

Yang and her colleagues used this information to examine the potential impact of further reform. The average village in the sample had transferred only 54% of its collective forests to individual household management by 2010 and very few villages province-wide had attained the government-approved transfer share of 90%. Continuing the transfers to the centrally approved 90% share would add 36 percentage points to the index of tenure reform. Projecting from the experience of the first ten years, this 36 percentage point increase might approximately double the fuelwood consumption benefits for Yunnan households.

In sum, tenure reform enabled the households to substitute an increased volume of fuelwood produced either from additional investment or from lands that were newly available as a result of the reform. This fuelwood substituted for energy from other sources, both other self-produced fuelwood and also market purchased energy. Its large share suggests a large increment from the reform forests. For these forests to have provided substantial amounts of fuelwood suggests additional investment and management on those forests that became the new responsibility of individual households. Therefore, the forest reforms not only modified household fuelwood consumption, they must have improved the forest environment as well. And, as they did improve the overall forest environment, they must have improved the production and consumption of other forest products and services just as they improved those of fuelwood.

13. Improved forest tenure and household inequality

Chen et al. (2016), in the final of this series of papers, inquired of the effect of forest tenure reform on inequality across households. Prior research has established that land tenure reform improves overall rural community welfare in very many local situations. This inquiry was somewhat different. It was motivated by observations of large disparities in household well-being in many developing countries and by particular concern with a growing disparity in China. The question for Chen and her colleagues was whether the measure of inequality has changed as a result of households obtaining increasing rights under the second round of forest reforms and, by implication, might inequality between households either increase or decrease if further reforms continue adding to the individual management rights for these forest lands?

Chen and her colleagues measured inequality as the absolute difference between each of four measures of the household's annual consumption and the consumption of the average household in the village. (Consumption was the preferred measure of well-being. It varies less than income and households generally report consumption more accurately than they report income.) Their regressions (after correcting for attrition in households observed from one survey year to the next and controlling for age, education, and household accumulation of assets) show that the increase in household forest management rights associated with China's second round of tenure reform decreased the inequality in household consumption, and further redistribution of the collective forests to household management would have additional favorable effect, potentially decreasing inequality by as much as 14.8%.

This conclusion is convincing. It holds for all three components of consumption; total daily consumption, consumption of consumer durables, and long-term consumption of housing (but without statistical significance for the second); as well as for the aggregate of all three. Furthermore, while tenure reform benefits most households, it benefits the consumption pattern of previously less-advantaged households relatively more than those previously better-advantaged households in the same village. (Note that these results are consistent with those for more specialized wood energy consumption discussed in the previous section.)

The regressions in this paper should that consumption itself probably does increase with the number of household members, including the number of children, with status, with education, and surely it increases with increases in the household's overall accumulation of assets. However, the coefficients do not measure change in consumption. They measure *change in inequality* in consumption, and inequality between households could (and often does) decrease as the household and certain of its characteristic assets expand. For example, consumption undoubtedly increases with household wealth but it may increase at a rate less than the increase in wealth, thereby allowing the consumption inequality between households to decrease as wealthier households add proportionately less to their consumption than less wealthy households.

From another perspective, while overall household inequality as a function of all external factors undoubtedly has been increasing, the second round of forest tenure reform has been a constraint on the increase, holding it to a lesser level of inequality than might have occurred without forest reform. As rural development continues and, particularly, as the rural village infrastructure improves, the inequality in consumption between households may continue to expand. However, Chen and her colleagues anticipate that tenure reform, if policymakers permit it to continue, will have a favorable limiting effect on that expansion.

This is an important observation—but it should not be surprising. It is clear from the other papers in this review that improved tenure benefits China's participating rural households. Those households use some of their resulting gains to increase their consumption. And lower income households, in China and elsewhere, consume a larger share of their income than their better off neighbors. With lower income

households consuming relatively more than better-off households, the inequality of income between the two should decline. The evidence of Chen et al. supports this expectation.

And, more broadly, while these results refer to Yunnan, just one province in China, can we inquire whether they have merit elsewhere in China and elsewhere in the world? We can expect similar results for further increases in the share of household management elsewhere in China. However, the collective forests are a smaller share of all land and a smaller share of the forest in the provinces that were not part of the Peking University sample. Therefore, while the effect may be similar for those households receiving forest user rights in other provinces, we might expect that the number of affected households and the area of forest transferred to individuals might be smaller in those others. The favorable impact on overall household inequality would still exist but it would be smaller than in the sample provinces.

The more important implications may be for those countries with large areas of public forest where those forests have attracted the attention of foresters who recommend local community-wide collective decision making. Local collective action is probably the dominant global policy recommendation for these lands. Our results in this analysis, however, suggest that this recommendation should be given cautiously. It may lead to improved management and even environmental conservation in some situations, but going the next step to local private rather than collective management may have the additional advantage of decreasing the inequities between local households that rely on the forest for a share of their livelihood.

13.1. Summary observations

We suggested that three central themes and five underlying questions arise throughout the six papers examining components of China's second round of policy reforms for the 40% of its forests that are collectively owned—but increasingly managed by individual households.⁶ The same themes; uncertainty, devolution and the policy process, and who benefits; and their underlying questions are crucial in discussions of global forest policy. We have summarized the six papers. This final section of this paper will integrate their observations with respect to those central themes and comment on discuss the contribution to forest policy reform in the rest of the world.

13.2. Uncertainty

The debilitating role of uncertainty is a primary observation to be taken from the first round of China's forest reforms. The raw survey data used in assessing the second round of reforms and underlying observations from several of the empirical papers support this observation—although generally from the improving perspective of increasing investor confidence and, therefore, lessening uncertainty over the period of the second round of forest reforms.

The fundamental argument is familiar and straightforward—for China or anywhere else. When land tenure is less certain, then managers are less inclined to invest and much less inclined to make long-term investments such as many of those in forestry. Greater uncertainty means less confidence that the investor can claim the eventual benefit from the investment. The uncertainty may refer to possession of the land and its use rights or it may refer to the markets for its products: their access, regulations, prices, taxes and fees. In either case, the expected eventual benefits from a current investment are less certain and, therefore, the forest manager is inclined to invest less—or not invest at all. The welfare of the investor is less, and the forest itself suffers.

For China, the first round of forest reforms shifted forest land use

⁶ Another reminder, as at the outset, these are not the state-owned forests that traditionally have been the greatest source of China's commercial timber. Those should be an important topic of altogether different inquiry.

rights to individual farm households. Households in some regions harvested timber and fuelwood and some households reinvested. Their forests grew and the overall environment improved. In other regions of the country where forest policy had changed four times during the previous 20 years and where policy makers showed their own doubts regarding the merits of the forest reforms, household managers could not be certain the new policy would be sustained. Households in these regions harvested but did not reinvest. Forests stagnated and even declined in some locations. The first regions benefited from reliable and consistent policy. Forests in the second region suffered in contrast and the source of their stagnation and decline was their changing and uncertain policy.

For the second round of forest reforms, the reforms that we examined, the raw survey data showed a 268% increase in forest investment per sampled province between the years 2000 and 2010, suggesting that prior uncertainty was no longer a deterrent to household investment in forestry. The second round of reforms consistently added to the duration of the household forest land use contracts and added to the bundle of land use rights, and the village collectives consistently increased the share of all collective forests that they transferred to household management. Very largely, households gained confidence (the opposite of uncertainty) over the course of the second round of reforms. In fact, Yi et al. showed that continually improving tenurial rights and improved household confidence were pre-conditions for investment. Xu et al. (2017b) showed that, with the added confidence of each additional year since the villages accepted the most recent reforms, households invested more of their own labor in forest management and also hired more outside labor. Siikamäki et al. took this insight another step and, looking to the future, showed that additional confidence in the new land use rights, and specifically in the right to make market transfers, would add as much as 50% to the value of such market transfers and 25% to the total transferred land area.

China's farm households have responded to a pattern of consistently improving land use rights, showing that consistently decreasing uncertainty encourages forest investment and an improving forest environment. Clearly, land managers benefit from confidence in the policy environment, confidence that the policy will not be reversed and, therefore, that the future benefits from the manager's investments will accrue back to the manager who made the investment. Of course, this is particularly true for those making long-term investments—and many forest investments are necessarily long term as forest production cycles tend to range upward from 20 years.

In sum, uncertainty is a serious constraint on any investment, and China has learned from its experience with uncertainty, but it is crucial that the rest of the world learns as well. Macroeconomists understand that general economic and political stability (again, the opposite of uncertainty) is a precondition for economic growth and development. Nevertheless, the concept has not been part of the literature of forest economics and policy. However, because much of the global interest in forestry today focuses on developing countries where economic and political stability is not a universal experience and where, not coincidentally, the rates of forest degradation and deforestation are greater and general forest management is a less frequent, it is crucial for our interest in the many modern forestry issues that tend to be global, issues like climate change and the protection of biodiversity, that we do learn from these Chinese examples and do recognize the importance of uncertainty in the selection, design, and administration of modern forest policy.

13.3. The reform process

The second general theme taken from China's experience and, indeed, from broader global experience as well is one of process. This is a broad theme incorporating what we have learned from global questions of devolution as well as from China's own applications.

13.4. Devolution

Global interest in devolution arises from observations of budgetarily unsuccessful and often environmentally unsustainable management by the forest agencies of central governments. Clearly, central government involvement is necessary in places like Yellowstone, Sagarmantha, and the Serengeti where the important resource values benefit human populations far beyond local resource boundaries. But what about cases where local values predominate? In fact, in many cases local values are consistent with continuing forest cover and, therefore, they are often consistent with global values like climate change and, in some cases, biodiversity. In the very many cases where local values do predominate, local managers can manage at lower cost and with more environmental success—and devolution from central authority to local resource management can have real merit. This is the valid basis for the global policy discussion favoring devolution.

Devolution to collective local management by a community-based authority is practical where members of the community share a value for the resource and where management scale is beyond the means of individual private operators. Town parks and other forested properties of collective community value anywhere in the world are examples. Other examples could include community grazing lands in some locations and, in China, the somewhat randomly dispersed forested sources of mushrooms in Yunnan.

Otherwise, continued devolution of the property rights from community management on to individual local managers may be preferable. For China, Yi et al. showed that individual managers invest more when their land use rights are more secure. Xu et al. (2017a) showed that individual managers invest less where the local community leaders interfere more actively in land management decisions and invest more where those same leaders are less involved. Siikamäki et al. showed that, for those who might lease forest land to others, renting to individuals is worth a premium over renting to groups. Similarly, leasing as an individual rather than as a group is worth a premium to the lessor.⁷

Finally, there is another argument, the social safety net, sometimes given as justification for community forest management. There can be no doubt about the usefulness of contingent resources in times of personal economic duress—and collectively managed community resources, such as forests, could provide this benefit. However, the observations of Xu et al. (2017b) regarding returning migrant labor, like those of Scherr (1995) for Kenya, show that the safety net is not a unique product of collective management. Individually managed forest plots also provide this insurance-like benefit for those households whose primary activity is agriculture but who also manage a residual of individual forested plots.

These observations from China are reinforcing for those of Andersson and Agrawal (2011) and Hyde (2016) cited earlier. They should give pause to recommendations for collective community institutions as a preferred final and permanent result of devolution. Taken altogether, the evidence from China and these other observations suggest that collective management will often be temporary, insufficient or even sub-optimal. Private values will often dominate and private forest management will be the more successful final goal of devolution in very many cases.

13.5. Policy design

Once policy makers determine to devolve the authority for forest management from central agencies to local households and individuals,

⁷ This assessment (Siikamäki et al., 2015) relied largely on a survey of anticipated household choices. It would be interesting to know how deliberate piloting before introduction might have recommended variation in new rental policies. It will also be interesting to observe how these same and other households continue responding in the future to these rental policies, and to others of the second round forest reforms. We thank an unidentified reviewer for encouraging this note and future follow-up research.

then the problem becomes one of identifying an effective policy design. Following successful initial design, we observed that application of the chosen policy, including identification of its imperfections and potential improvements, and then the opportunity for still further beneficial reform, rapidly occur as important additional issues.

Successful policy design begins with the identification of which rights should be transferred and in what sequence. China's experience transferring first limited, then more complete, land use rights at different rates in different provinces permitted gradual adjustment. It also permitted comparisons as different villages, counties and provinces transferred different rights more or less rapidly than others. This local and piecemeal approach allowed for observation and learning from the most successful applications as the transfer process proceeded from village to provincial levels and then to national approval.

China showed a preference for beginning with the transfer of land use rights themselves. The prior literature on tenure and investment is mixed, but some of that literature (cited in Yi et al.) supports the contrasting preference for improving those institutional arrangements that enable investment first—with the expectation that improved tenure (or land use rights) will follow. The majority of this literature relies on observations from agriculture in various regions in Africa and a few in Latin America.

Two differences distinguish our assessment: forestry instead of agriculture, and the distinction between household perceptions of the security of tenure and household perceptions of the contracted and transferable rights to the forest property. Several observations in the previous literature have to do with claims on open land at a frontier of current settlement. In China, in contrast, such claims were established with the local collective long before China's recent reforms. The forest plots in question in China were not open land and they were not at the frontier of human settlement. Therefore, combining the experience from Africa and Latin America with that from China, we might hypothesize that the local situation determines whether transferring the rights, or improving the institutions enhancing local investment opportunity, is the preferred first step. Where the land in question is essentially open access without well-established formal claims, then investment may be the factor that establishes the land use rights. However, where the land in question is not open (where there were established prior claims, as in China), then the causal direction reverses and possession of a measure of the rights to the land is a prerequisite for investment and, as in China, improving the individual rights is a more effective first step.

We might even consider phrasing the contrast more broadly as whether improved forest tenure should be the preferred target—as improved household welfare will follow from it—or is improving local welfare the better policy as improved forest tenure is its natural successor? Those agricultural experiences encouraging investment first are, more broadly, encouragement for general regional development—with the expectation that land use rights will follow. Our hypothesis reconciling the various different geographic and agriculture and forestry experiences remains unchanged.

The next step in the policy process is the implementation of the transfer of rights, the actual land transfer itself. China passed this responsibility to each local village which, of course, means that implementation became the responsibility of the local leaders. In some villages, these local leaders used their personal authority to slow the process, retaining some forest in collective management and, therefore, under the leaders' own continued authority. In others, the village leaders extracted payments from the individual recipients of the new forest use rights. In still others, the individual household received limited rights, but without any requirement to compensate the village leaders. The interesting question becomes one of identifying the factors that lie behind the different implementation from village to village and the answer should be instructive for future plans to obtain greater compliance with the central government's intention to transfer 90% of all village forests without retaining additional lands under village

authority and without obtaining financial compensation for the village leaders.

Xu et al. (2017a) showed that the relative authority of local leaders, the homogeneity of the village, and its remoteness or, alternatively, its access to external markets explain much of the likelihood of delays in the transfers of new rights. Therefore, greater village democracy resulting in more responsive elected leaders would seem to be one means to improvement. In its absence, central and provincial government monitoring and enforcement (M&E) could be another and this M&E might focus on villages where remittances have been required, often villages with long-term established leaders and good access to alternative employment. This would be a step toward improving the application of current policy. But could the policy itself be improved?

13.6. Continuing reform

The gradual increase in forest use rights at different rates across different villages and provinces suggests an obvious next step. The improvement in the land use rights has been continuous and beneficial during the second round of China's forest reforms, but not all villages and provinces have transferred the same bundle of rights. Therefore, the easy first recommendation would be to review policy in those villages and provinces that have responded to existing policy more cautiously. In these, the recommendation would be to continue the process, transferring more complete rights, including the rights to modify and even alter land use and the right to exchange forest land between households and villages.

The most recent central government policy (the "Guidelines" of 2008) requires the distribution of formal certificates of forest land use to the households. These certificates can be used as collateral for loans and, therefore, the finances that would provide the means for greater investment opportunity both within forestry and for other household activities as well. Of course, this suggests developing markets for capital and land and these, while limited, are beginning to appear in a few rural counties. These markets assist in establishing value and, therefore, in providing incentives to invest where forest tenure is secure. Therefore, in China, the next step in government policy desirous of encouraging forest investment and regional development might be to build financial infrastructure and to implement enforceable mechanisms for credit markets. This may also be a good recommendation for those other countries contemplating devolution of forest lands which are often at the geographic frontier of economic development, a frontier which is often characterized by little development of those financial institutions that can assist development.

Finally, Siikamaki et al. showed that two additional factors may limit market development even in the presence of the growing receipt of land use certificates and the development of rural financial institutions. That is, market supply will be constrained until the lessors of forest land are confident of their rights to recover their lands after the leases expire and market demand will be constrained until renters are confident of their right to sublet. Insuring that both lessors and renters of forest land have these rights might be expected to further improve market opportunity and local development.

13.7. Who benefits

The most immediate benefactors of tenure reform are those households who received the new forest land use rights. But can we be more specific? Which households benefitted most and how did these benefits work out in the long run?

The pattern of effects on rural labor (Xu et al., 2017b) provides the first insight to this question. The receipt of improved rights provided a new production opportunity for members of the households that received the improved rights and for local wage labor as well. As it did, it deterred some workers from migrating and attracted a small share of prior migrants back to the local community with new forest

opportunity. Production increased in the households with the new rights and this must have aided local economic development. It was a limiting factor on rural migration to the cities, a crucial problem in China and in many other developing countries too.

Within households, Yi et al. observed a life cycle pattern of effects for holders of forest user rights in the US: Young households benefit from harvests that support growing family needs, while mid-career households benefit by investing their greater family resources for potential longer-term gain. Both anticipate consumption from these investments as their families mature, their available labor declines, and their personal means also decline.

Finally, Yang et al. traced the increased forest opportunity to its effect on household consumption. Households at all income levels increased their consumption of fuelwood and, since fuelwood may be the most widely used forest product, we can probably assume that this finding is valid for the consumption of forest products in general. More specifically, lower income households benefitted relatively more than those with greater income but larger income households benefitted absolutely more. Over a longer period and considering the impact on all categories of household consumption, Chen et al. (2016). observed that generalized consumption benefits from forest reforms were sufficiently great for lower income households to have a limiting effect on the increasing overall community consumption inequality that has occurred simultaneously with China's rural development. These observations are crucial for policy makers concerned with either forestry or more general rural development.

In sum, while our focus has been on China, the evidence from these six studies should be relevant for other countries considering the devolution of centrally managed forests to some variety of local management. We anticipate that the same policy attributes that establish effective markets and promote efficient management in China and similar household preferences for individual rather than joint management would be important considerations when establishing effective decentralized forest management elsewhere in the world. The decentralization of publicly managed forests is the single greatest global forest policy topic of the early 21st century—whether the intent is to deter further deforestation (and to retain stored carbon, protect existing biodiversity, or conserve watersheds) or to formalize de facto local forest activity (e.g., “joint forest management” in India, “community forestry” in Nepal, “public participation” in the US, or “First People's” rights in Canada). China's experience with decentralization is further along than almost anywhere else. Its experience may or may not prove to be directly transferrable universally, but it is among the most formidable evidence we have on these topics today.

Furthermore, we anticipate that as devolution occurs, China's experience with the next questions; the appropriate bundle of land use rights, their effective transfer, the financial institutions that can improve their effectiveness in assisting regional economic development, and the question of who benefits; will become important for other countries as they too experiment with the devolution of forest

management and ownership rights. The insights regarding who has benefitted from China's reforms may be among the most interesting—as this distributive question has seldom been addressed in association with tenure reform and distributive effects are perhaps the greatest reason that policy makers in general are interested in rural development in China and everywhere else.

References

- Andersson, K., Agrawal, A., 2011. Inequalities, institutions, and forest commons. *Glob. Environ. Chang.* 21, 866–875.
- Besley, T., 1995. Property rights and investment incentives: theory and evidence from Ghana. *J. Polit. Econ.* 103 (5), 903–937.
- Binkley, C., 1981. Timber Supply From Non-Industrial Private Forests. *Bulletin No. 92.* Yale University School of Forestry and Environmental Studies, New Haven.
- Chen, S., Huang, Z., Xu, J., 2016. Collective forest tenure reform and rural consumption inequality: evidence from collective forest areas in China. In: *EfD Discussion Paper No XX Available From Gothenburg University, Sweden and Peking University.*
- Fisher, M., Shively, G., 2005. Can income programs reduce tropical forest pressure? *Income shocks and forest use in Malawi.* *World Dev.* 33 (7), 1115–1128.
- Hyde, W., 2012. *The Global Economics of Forestry.* RFF Press/Routledge, New York.
- Hyde, W., 2016. Whereabouts devolution and collective forest management. *Forest Policy Econ.* 72, 85–91.
- Hyde, W., Kohlin, G., 2000. Social forestry reconsidered. *Silva Fennica* 34 (3), 285–315.
- Hyde, W., Belcher, B., Xu, J. (Eds.), 2003. *China's Forests: Global Lessons From Market Reforms.* Resources for the Future and Center for International Forestry Research, Washington.
- Joyeux, R., Ripple, R.D., 2007. Household energy consumption versus income and relative standard of living: a panel approach. *Energy Policy* 35, 50–60.
- Lin, J., 1992. Rural reforms and agricultural growth in China. *Am. Econ. Rev.* 81, 34–51.
- McMillan, J., Naughton, B., 1992. How to reform a planned economy: lessons from China. *Oxf. Rev. Econ. Policy* 8 (1), 130–143.
- Runge, C., 1981. Common property externalities: isolation, assurance, and resource depletion in a traditional grazing context. *Am. J. Agric. Econ.* 63 (4), 595–606.
- Scherr, S., 1995. Economic factors in farmer adoption of agroforestry: patterns observed in western Kenya. *World Dev.* 23 (5), 787–804.
- Siikamäki, J., Ji, Y., Xu, J., 2015. Post-reform forestland markets in China. *Land Econ.* 91 (2), 211–234.
- Sunderlin, W., Angelsen, A., Wunder, S., 2003. *Forests and poverty alleviation.* In: *FAO, State of the World's Forests.* Food and Agriculture Organization of the UN, Rome, pp. 62–73.
- White, A., Martin, A., 2002. *Who Owns the World's Forests?* Forest Trends, Washington.
- Xu, J., Deininger, K., Hyde, W., 2015. *China's Collective Forests: Global Lessons From Tenure Reform.* draft document available at. Peking University's College of Environmental Science and Engineering.
- Xu, J., Deininger, K., Siikamäki, J., Hyde, W., 2017a. Decision of forest tenure reform under imperfect democracy. In: *EfD Discussion Paper No XX.* Gothenburg University, Sweden and Peking University Available from.
- Xu, J., Deininger, K., Ji, Y., Hyde, W., 2017b. Forest tenure reform and the allocation of rural labor. In: *EfD Discussion Paper No XX.* Gothenburg University, Sweden, and Peking University Available from.
- Yang, X., Xu, X., Xu, J., Hyde, W., Yi, Y., 2016. Collective forest tenure reform and household energy consumption: a case study in Yunnan Province. In: *Draft Manuscript Submitted to China Economic Review.* Peking University's College of Environmental Science and Engineering available from.
- Yi, Y., Köhlin, G., Xu, J., 2014. Property rights, tenure security and forest investment incentives: evidence from China's collective forest tenure reform. *Environ. Dev. Econ.* 19, 48–73.
- Yin, R., Hyde, W., 2000. The impact of agroforestry on agricultural productivity: the case of northern China. *Agrofor. Syst.* 20, 179–194.
- Yin, R., Newman, D., 1997. The impact of rural reform on China's forestry development. *Environ. Dev. Econ.* 2 (3), 289–303.